MHM-11

VOLUME TWO

SUPPORTING DOCUMENTS

# HISTORY of the



## GEORGE C. MARSHALL SPACE FLIGHT CENTER

## JANUARY 1 - DECEMBER 31, 1965

MSFC Historical Monograph No. 11

(MHM-11)

# HISTORY OF THE GEORGE C. MARSHALL SPACE FLIGHT CENTER FROM JANUARY 1 THROUGH DECEMBER 31 1965

## VOLUME TWO

by

MSFC Historical Office

Management Services Office
George C. Marshall Space Flight Center
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Huntsville, Alabama

VOLUME II

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# I

# MSFC MANPOWER STATUS SUMMARY

December 31, 1965

COMPILED BY: MA-MM 877-2080

# MSFC MANPOWER STATUS SUMMARY

AS OF DATE: December 31, 1965

| ORGANIZATION | VOUCHERED CEILING | CIVIL SERVICE | | | | | | BY LOCATION | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PERMANENT PERSONNEL | | NON-PERMANENT PERSONNEL | | | COMMITTED PERMANENT | ON RSA | HIC CLINTON ETC. | OUTSIDE H'VILLE AREA |
| | | ON-BOARD PERMANENT | C&E | ON-BOARD CO-OPS | 700 HOUR ON-BOARD | SUMMER ON-BOARD | | | | |
| Director & Deputies | 28 | 25 | 1 | | | | | 26 | | |
| Assistant Directors | 2 | 1 | | | | | | 1 | | |
| Executive Staff | 88 | 76 | | | | | 1 | 76 | | |
| Chief Counsel | 23 | 20 | | 2 | | | | 22 | | |
| Labor Relations Office | 5 | 5 | | | | | | 5 | | |
| Public Affairs Office | 30 | 29 | | 1 | | | | 30 | | |
| NASA Audit Office | 20 | 19 | | | | | | 0 | 13 | 6 |
| Facilities & Design Office | 108 | 100 | | 4 | | | | 102 | | 2 |
| Financial Management Office | 197 | 181 | | 2 | 1 | | | 184 | | |
| Management Services Office | 213 | 196 | | | 5 | | | 181 | 20 | |
| Manpower Utilization & Admin | 101 | 107 | | 1 | 20 | | | 128 | | |
| Purchasing Office | 224 | 209 | | 6 | 27 | | 4 | 60 | 182 | |
| Technical Services Office | 593 | 565 | | 2 | 2 | | 2 | 568 | 1 | |
| UNALLOCATED | -45 | | | | | | | | | |
| SUB-TOTAL | 1587 | 1533 | 1 | 18 | 55 | 0 | 7 | 1383 | 216 | 8 |
| Director, R&D Operations | 7 | 7 | | | | | | 7 | | |
| Operations Management Office | 58 | 46 | | | | | 2 | 46 | | |
| Technical Systems Office | 12 | 2 | | | | | | 2 | | |
| Technical Staff Office | 14 | 32 | | | | | | 32 | | |
| Advanced Systems Office | 64 | 41 | 1 | 1 | | | | 43 | | |
| Resources Management Office | 0 | 0 | | | | | | 0 | | |
| Systems Office | 0 | 0 | | | | | | 0 | | |
| Aero-Astrodynamics Lab | 340 | 345 | 9 | 28 | | | 5 | 372 | 1 | 9 |
| Astrionics Lab | 914 | 905 | 2 | 37 | 5 | | 8 | 918 | 27 | 4 |
| Computation Lab | 173 | 163 | 1 | 5 | | | 6 | 169 | | |
| Manufacturing Engr Lab | 788 | 785 | | 4 | | | 3 | 779 | | 10 |
| Propulsion & Vehicle Eng Lab | 788 | 776 | 5 | 34 | 1 | | 11 | 702 | 108 | 6 |
| Quality & Rel Assurance Lab | 613 | 610 | | 20 | 2 | | 4 | 530 | 15 | 87 |
| Research Projects Lab | 100 | 100 | | 9 | | | 1 | 104 | | 5 |
| Test Lab | 710 | 695 | | 20 | 1 | | 4 | 676 | | 40 |
| UNALLOCATED | | | | | | | | | | |
| SUB-TOTAL | 4581 | 4507 | 18 | 158 | 9 | 0 | 44 | 4380 | 151 | 161 |
| Director, Industrial Operations | 15 | 15 | | | | | | 12 | | 3 |
| Contracts Office | 148 | 145 | | | 3 | | 1 | 124 | | 24 |
| Facilities Projects Office | 40 | 39 | | | | | | 28 | | 11 |
| Project Logistics Office | 18 | 18 | | | 1 | | 1 | 17 | | 2 |
| Resources Management Office | 34 | 33 | | | 3 | | 2 | 36 | | |
| Engine Projects Office | 119 | 119 | | 1 | 2 | | 2 | 87 | | 35 |
| Saturn V Project Office | 244 | 237 | | | 7 | | 2 | 219 | | 25 |
| Saturn I/IB Project Office | 155 | 146 | | | 4 | | 1 | 120 | | 30 |
| Saturn IB Centaur Office | 29 | 20 | | | | | | 20 | | |
| Mississippi Test Facility | 103 | 98 | | 7 | 10 | | 1 | 10 | | 105 |
| Michoud Assembly Facility | 282 | 278 | | | | | 4 | 0 | | 278 |
| Mgr., Mission Operations | 23 | 30 | | | | | 1 | 24 | | 6 |
| UNALLOCATED | 1 | | | | | | | | | |
| SUB-TOTAL | 1211 | 1178 | 0 | 8 | 30 | 0 | 15 | 697 | 0 | 519 |
| TOTALS | 7379 | 7218 | 19 | 184 | 94 | 0 | 66 | 6460 | 367 | 688 |

NOTES:

| SUMMARY: | PERMANENT PERSONNEL | | | NON-PERMANENT PERSONNEL | | | TOTAL CIVIL SERVICE | MILITARY DETAIL |
|---|---|---|---|---|---|---|---|---|
| | CLASS ACT | WAGE BOARD | C&E | CO-OPS | 700 HOUR | SUMMER | | |
| CEILING | 7360 | | 19 | 169 | 0 | 0 | 7548 | N/A |
| ON BOARD | 7218 | | | | | | | |
| | 5870 | 1348 | 19 | 184 | 94 | 0 | 7515 | 37 |
| COMMITTED | 66 | | 0 | 0 | 0 | 0 | 66 | 2 |
| VACANCIES | 76 | | 0 | -15 | -94 | 0 | -33 | N/A |

MSFC - Form 524 (Rev December 1965)

# II

# MSFC CONTRACTOR STATUS

December 31, 1965

COMPILED BY:

MA-MM 877-2080

# MSFC CONTRACTOR STATUS AS OF December 31, 1965

| ORGANIZATION | | CONTRACTORS* TOTAL ON-BOARD | ON RSA | HUNTSVILLE OFF POST GOV'T FAC | OUTSIDE HUNTSVILLE GOV'T FAC | LOCAL CONTRACTOR FACILITY |
|---|---|---|---|---|---|---|
| Facilities & Design Office | | 69 | | 69 | | |
| Aero-Astrodynamics Lab | | 232 | 80 | | | 152 |
| Astrionics Lab | | 732 | 330 | 14 | 133 | 255 |
| Computation Lab | | 496 | 456 | 7 | | 33 |
| Manufacturing Engr Lab | | 435 | 270 | | 165 | |
| Propulsion & Vehicle Engr Lab | | 1021 | 494 | 214 | | 313 |
| Quality & Rel Assurance Lab | | 696 | 440 | | 16 | 240 |
| Research Projects Lab | | 31 | 21 | | | 10 |
| Test Lab | | 892 | 815 | | | 77 |
| Mission Operations Ofc, IO | | 15 | | | 10 | 5 |
| TOTALS | | 4619 | 2906 | 304 | 324 | 1085 |

REMARKS *Includes contractors in the following categories:
1. Prime contractor performing in-house mission support.
2. MSFC In-House Mission Support Contractors.
3. Contractor operators.
4. Fabrication Support.
5. Others in support of R&D.

| | | INSTALLATION CONTRACTORS** | | | | |
|---|---|---|---|---|---|---|
| Management Services Office | | 875 | 779 | 61 | | 35 |
| Technical Services Office | | 541 | 482 | | | 59 |
| Michoud Operations | | 957 | | | 957 | |
| Mississippi Test Operations | | 2251 | | | 2251 | |
| TOTALS | | 4624 | 1261 | 61 | 3208 | 94 |

REMARKS: **Includes contractors in the following categories:
1. Prime Service & Maintenance Contractors -- including Management.
2. Smaller Services & Maintenance Contractors.
3. Product Service Contractors.
4. Concession Contractors.

| | | | | | | |
|---|---|---|---|---|---|---|
| GRAND TOTAL | | 9243 | 4167 | 365 | 3532 | 1179 |

REMARKS:

MSFC - Form 1962 (October 1963)

# III

## MSFC COSTS FOR PERIOD

## January 1, 1965, through December 31, 1965

GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA

# Memorandum

TO : D. S. Akens, MS-H DATE: February 17, 1966

FROM : Chief, Budget and Operations Branch, FIN-B

SUBJECT: MSFC costs for period January 1, 1965, through December 31, 1965

The Marshall Space Flight Center's direct program costs and applicable indirect costs are summarized briefly as follows:

| Classification<br>Direct Costs | Actual Costs<br>(In Thousands of Dollars) |
|---|---|
| Saturn I | 35,605 |
| Saturn IB | 322,508 |
| Saturn V | 1,157,028 |
| H-1 Engine Development | 8,716 |
| RL-10 Engine Development | 11,654 |
| F-1 Engine Development | 53,491 |
| J-2 Engine Development | 54,930 |
| C-1 Engine Development | 1,291 |
| Engine Support | 27,234 |
| RIFT | 605 |
| Pegasus | 8,249 |
| Supporting Research and Technology | 32,171 |
| Work for other NASA Centers | 12,135 |
| Reimbursable | 294 |
| Other | 24,586 |
| Total Direct Costs | 1,750,497 |
| Indirect Costs | 83,482 |
| TOTAL COSTS | 1,833,979 |

Louis E. Snyder

IV

# INCENTIVE AWARDS PROGRAM DATA

January 1, 1965, through December 31, 1965

Submitted by

Leroy Aderholt
Incentive Awards Committee
Manpower Utilization and Administration Office
February 16, 1965

## Incentive Awards Program Data

1. One hundred ten sustained superior performance award nominations were received by the Incentive Awards Committee during the period covered. Fifty-two were approved for cash awards totaling $17,975 and tangible savings of $1,211,156. The names and work locations of employees for whom sustained superior performance awards were approved are as follows:

| | |
|---|---|
| Melvin Brooks | Astrionics Laboratory |
| Dwight J. Locke | Propulsion and Vehicle Engineering Laboratory |
| Hazel H. Sanders | Propulsion and Vehicle Engineering Laboratory |
| Harlin H. Aderhold | Propulsion and Vehicle Engineering Laboratory |
| James H. Coleman | Quality and Reliability Assurance Laboratory |
| Charles E. Lifer | Propulsion and Vehicle Engineering Laboratory |
| James M. Sisson | Saturn I-I/IB Program Office |
| Archie D. Wilder | Purchasing Office |
| Perley H. Wormell | Manufacturing Engineering Laboratory |
| Buddie J. Martin | Research and Development Operations |
| Melvin E. Shelton | Management Services Office |
| Walter T. Mitchell | Quality and Reliability Assurance Laboratory |
| Zack Thompson | Astrionics Laboratory |
| Donald W. Mann | Astrionics Laboratory |
| Lowell D. Martin | Financial Management Office |
| Martin F. Sedlazek | Saturn V Program Office |
| Edwin A. Weaver | Saturn I-I/IB Program Office |
| John E. Lewis | Astrionics Laboratory |
| John M. Caudle | Astrionics Laboratory |
| Joseph D. Hammer | Contracts Office |
| William Fenner, Jr. | Quality and Reliability Assurance Laboratory |
| Hal S. Gwin | Aero-Astrodynamics Laboratory |
| Jerry L. Siniard | Engine Program Office |
| Paul T. Marquess | Financial Management Office |
| William B. Moore, III | Technical Services |
| Ronald G. Toelle | Aero-Astrodynamics Laboratory |
| William V. Castleberry | Quality and Reliability Assurance Laboratory |
| Paul H. Schuerer | Manufacturing Laboratory |
| Richard W. Schock | Propulsion and Vehicle Engineering Laboratory |
| Adonna Mitchell | Contracts Office |
| Onice M. Hardage | Aero-Astrodynamics Laboratory |
| Carl T. Walker | Aero-Astrodynamics Laboratory |
| Hans Goldstein | Test Laboratory |
| Brenda H. McAlister | Saturn V Program Office |
| Ronald G. Weesner | Engine Program Office |
| Robert G. Mills | Propulsion and Vehicle Engineering Laboratory |
| Roy A. Burrough | Test Laboratory |
| Hilda A. Garofalo | Michoud Assembly Facility |
| Gerald D. Ridgeway | Purchasing Office |
| Duron Crider | Purchasing Office |
| Charlie Gibbs | Test Laboratory |

| | |
|---|---|
| Theresa I. Bohlke | Michoud Assembly Facility |
| Edward W. Ball, Jr. | Test Laboratory |
| Billy Carl Walley | Test Laboratory |
| Sandra O. Hughes | Aero-Astrodynamics Laboratory |
| Myrle W. Freeman | Computation Laboratory |
| Rexford D. Atchley | Propulsion and Vehicle Engineering Laboratory |
| Maria M. Burkhardt | Michoud Assembly Facility |

2. Eleven employees received outstanding performance ratings during the period covered and their names and work locations are as follows:

| | |
|---|---|
| Buddie J. Martin | Research and Development Operations |
| Edwin A. Weaver | Saturn I-I/IB Program Office |
| Clemons T. Glen | Saturn V Program Office |
| Bill H. Sneed | Saturn V Program Office |
| James E. Bradford | Saturn V Program Office |
| Ernestine P. Bullington | Saturn V Program Office |
| Jerry C. McCall | Research and Development Operations |
| Dieter Grau | Quality and Realibility Assurance Laboratory |
| Christine H. Holloway | Director's Office |
| Heinz H. Koelle | Future Projects Office |
| Mary A. Downer | Saturn I-I/IB Program Office |

3. William D. Adkins, Clarence H. Brown, Ralph W. Clatworthy, Jimmie W. Glover, William J. Miller, Frances P. Morrison, Raymond A. Parsley, Thomas D. Shoe, John M. Stuart, and Samuel T. Willis of the Purchasing Office shared a $500 Group Achievement Award for their fine work in the Studies Section.

4. Edward T. Mallory of the Executive Staff received a $100 Special Service Award for his efforts in devising and establishing a meaningful method of collecting budget data from the MSFC Laboratories.

Kenneth G. Baird of the Saturn V Program Office received a $200 Special Service Award for outstanding accomplishments and special services as the key team member of a group conducting a review of manpower and costs projections for the development of the S-IC Stage.

5. During the month of December 1965, a total of $48,250 in Superior Achievement Awards was presented to four hundred ninety-four Marshall Center employees. Superior Achievement Awards in the amount of $50, $100, or $200 were given to employees who performed their duties in an outstanding manner and contributed significantly toward the completion of major milestones. The milestones included the following: Pegasus Project Completion, Saturn I Program Completion, S-IC-T Assembly and First Phase Static Test, S-IC-501 Roll Out, and S-IVB Battleship Static Test.

On December 22, 1965, in the Morris Auditorium, Dr. Von Braun, addressed a large number of the employees who received the Superior Achievement Awards,

and presented Certificates of Merits to forty-three of his laboratory directors, office chiefs, and other top management people for their noteworthy performance and outstanding contributions to significant program accomplishments of the Center.

6. One thousand thirty-eight suggestions were received. Two hundred twenty-two were adopted with estimated first year savings of $267,750. Suggesters received $13,260 in awards for adopted suggestions. Largest suggestion award, $980, went to William S. Porter of the Saturn V Program Office, Richard H. Jackson and Edward T. Mallory, both of the Executive Staff, for their suggestion concerning the machine programing of the Program Operating Plan.

Betty R. Biggerstaff, Computation Laboratory, received a $685 award for her suggestion recommending verification of invoices submitted by IBM Corporation for extra use charges.

George T. Jarrett, Computation Laboratory, received a $630 award for his suggestion concerning the remote controlling of magnetic tape recorders in building 4663 from Green Mountain through existing facilities.

Jack R. Gregg, Astrionics Laboratory, received a $500 award for his suggestion recommending a reduction in the number of memorandums required to release a change to a Saturn electrical interface control document.

Walter D. Caldwell, Propulsion and Vehicle Engineering Laboratory, received a $500 award for his suggestion that half reels of magnetic tape be used in lieu of full reels in the computer operation of Experimental Structures Branch.

William Knowles, Test Laboratory, received a $500 award for his suggestion concerning the design and construction of a hydraulic braid reliever and expander used in assembling flexible hose.

7. The Public Affairs Office won the Director's Suggestion Award Plaque for the first two quarters of the period; the Management Services Office for the third quarter; and the Contracts Office for the fourth quarter.

8. Twenty-three invention awards totaling $8,850 were approved by NASA Headquarters for Center employees. Adolph L. Herrmann, Astrionics Laboratory, received $250 for his invention entitled "Locking Device"; Dolphus H. Black, Propulsion and Vehicle Engineering Laboratory, received $50 for his invention entitled "Storage Container Mounting for Space Vehicles"; Richard Schmidt, Aero-Astrodynamics Laboratory, received $100 for his invention entitled "Reactance Control System"; Timothy O. Eddins, Manufacturing Engineering Laboratory, received $300 for his invention entitled "Missile Launch Release System"; Josef F. Blumrich, Propulsion and Vehicle Engineering Laboratory, received two awards -- $200 for his invention entitled "Double Acting Shock Absorber" and $200 for his invention entitled "Landing Pad Assembly for

Aerospace Vehicles"; Aubrey S. Drummond, Manufacturing Engineering Laboratory, received $200 for his invention entitled "Flexible Back-Up Bar"; William J. Franklin and Neil C. Martin, Manufacturing Engineering Laboratory, received $100 each for their invention entitled "Segmented Back-Up Bar"; George Landwehr Von Pragenau and Wilhelm Angele, Astrionics Laboratory, received $100 each for their invention entitled "Apparatus for Dynamic Testing"; Vaughn H. Yost, Manufacturing Engineering Laboratory, received $500 for his invention entitled "Welding Skate and Track"; William J. Franklin and Neil C. Martin, Manufacturing Engineering Laboratory, received $400 each for their invention entitled "Portable Alignment Tool" Dolphus H. Black, Propulsion and Vehicle Engineering Laboratory, received $400 for his invention entitled "Fluid Transporting System"; James R. Scoggins, Aero-Astrodynamics Laboratory, received $1,000 for his invention entitled "Spherical Ballon Wind Sensor"; Albin E. Whitman, Quality and Reliability Assurance Laboratory, received the largest award for the year, $1,200, for his invention entitled "Centrifuge Type Dip, Spin, and Sling Method for Coating the Circuit Paths of Printed Circuit Boards"; Claude J. Bowen, Saturn V Program Office, received $100 for his invention entitled "Connector Fitting With Locking Means"; James B. Huff, Facilities and Design Office, received $100 for his invention entitled "Three-Wire Receptical Testing Instrument"; Fritz Kramer, Test Laboratory, received $700 for his invention entitled "**Devise** and Method for Supressing Sound and Heat Produced by High Velocity Exhaust Jets"; Richard L. Brown, Engine Program Office, received $200 for his invention entitled "Gimbaled, Partially Submerged Rocket Nozzle"; Carl H. Mandel and Herman E. Thomason, Astrionics Laboratory, received $100 each for their invention entitled "Azimuth Laying System"; Jay H. Lane, Propulsion and Vehicle Engineering Laboratory, received $500 for his invention entitled "Multi-Mission Module"; Frederic E. Wells, Quality and Reliability Assurance Laboratory, received $600 for his invention entitled "Positive Displacement Flowmeter"; Alonza J. Davis, Astrionics Laboratory, received $300 for his invention entitled "Fiber Optic Vibration Transducer and Analyzer"; and Robert J. Carmody, Manufacturing Engineering Laboratory, received $300 for his invention entitled "Vacuum Apparatus".

9. Three employees received Presidential Citations during the period covered. Ralph Butler, Aero-Astrodynamics Laboratory, received a Citation for his suggestion concerning an improved method of measuring local atmospheric conditions by using radio-controlled model aircraft. Franklin E. Williams, Saturn V Program Office, received a Citation for two cost reduction proposals -- one concerns X-ray radiation protection for personnel and the other an inexpensive covering for clean room insulation. Robert A. Bush, Facilities Project Office, received a Citation for his recommendation for modification to the S-11 Checkout Facility at Seal Beach, California.

10. Nine hundred three letters of appreciation and three hundred one letters of commendation were presented to Center employees during this period.

11. Following is a breakdown of NASA honorary service awards presented Center employees during the period covered:

| | |
|---|---|
| 30 year | 14 |
| 20 year | 232 |
| 15 year | 281 |
| 10 year | 375 |
| 1 year | 666 |

12. The Marshall Center celebrated NASA's seventh anniversary with a ceremony in front of building 4200 on November 5, 1965. Highlights of the occasion were addresses by Mr. William B. Rieke, Deputy Associate Administrator for Industry Affairs, NASA Headquarters, and Dr. Wernher Von Braun, Director, MSFC, and presentation of a number of awards. The Reverend Paul Clem gave the invocation and benediction. Other distinguished guests present and making short talks were Mr. James R. Record, Chairman, Board of County Commissioners, and the Honorable Glenn H. Hearn, Mayor, Huntsville, Alabama. Music was provided by the Butler High School Band. Dr. Von Braun presented awards to the following employees:

30-Year Service Emblems

| | |
|---|---|
| Charles R. Byerline | Financial Management Office |
| Lynn Jonakin | Technical Services Office |
| Harold K. Katz | Management Services Office |
| David M. Price | Engine Program Office |
| Willie S. Wilson, Jr. | Astrionics Laboratory |
| Ben F. Morrow | Technical Services Office |

20-Year Service Emblems

| | |
|---|---|
| Konrad K. Dannenberg | Technical Staff |
| Ernst D. Geissler | Aero-Astrodynamics Laboratory |
| Dieter Grau | Quality & Reliability Assurance Laboratory |
| Helmut Hoelzer | Computation Laboratory |
| Hans Hueter | Industrial Operations |
| Werner R. Kuers | Manufacturing Engineering Laboratory |
| William A. Mrazek | Industrial Operations |
| Erich W. Neubert | Office of the Director |
| Eberhard F. M. Rees | Office of the Director |

Sustained Superior Performance Awards

| | |
|---|---|
| William V. Castleberry | Quality & Reliability Assurance Laboratory |
| Hans Goldstein | Test Laboratory |
| Onice M. Hardage | Aero-Astrodynamics Laboratory |
| Adonna Mitchell | Contracts Office |
| Richard W. Schock | Propulsion & Vehicle Engineering Laboratory |
| Paul H. Schuerer | Manufacturing Engineering Laboratory |
| Ronald G. Toelle | Aero-Astrodynamics Laboratory |
| Carl T. Walker | Aero-Astrodynamics Laboratory |

Special Service Award

| | |
|---|---|
| Kenneth G. Baird | Saturn V Program Office |
| Walter D. Caldwell | Propulsion & Vehicle Engineering Laboratory |
| Oma B. White | Management Services Office |
| John E. Hollander | Manufacturing Engineering Laboratory |

Invention Awards

| | |
|---|---|
| Dolphus H. Black | Propulsion & Vehicle Engineering Laboratory |
| James R. Scoggins | Aero-Astrodynamics Laboratory |
| Albin E. Whittmann | Quality & Reliability Assurance Laboratory |
| Vaughan H. Yost | Manufacturing Engineering Laboratory |

Co-Inventors

| | |
|---|---|
| William J. Franklin | Manufacturing Engineering Laboratory |
| Neil C. Martin | Manufacturing Engineering Laboratory |

Presidential Citation

| | |
|---|---|
| Robert A. Bush | Facilities Projects Office |

Suggestion Award Plaque

Management Services Office

# V

## PATENTS ISSUED TO MSFC EMPLOYEES

January 1, 1965 - December 31, 1965

GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA

# *Memorandum*

TO : Mr. David S. Akens, MS-H

DATE: February 3, 1966

In reply refer to: CC-P

FROM : Patent Counsel, CC-P

SUBJECT : Annual History, 1965, Patent Operations

The Patent Counsel Office received a total of 587 invention disclosures during 1965 and filed 27 applications for letters patent.

The following patents were issued to MSFC employees during the year by the U.S. Patent Office:

| INVENTOR(S) | PATENT NO. | DATE OF ISSUE | TITLE OF INVENTION |
|---|---|---|---|
| Oscar C. Holderer | 3,164,023 | 1-5-65 | Motion Sensing Transducer |
| William A. Schulze & Herbert W. Fuhramn | 3,164,992 | 1-12-65 | Liquid Level Indicating Varying Device |
| Charles E. Lee and Richard L. Moore | 3,167,731 | 1-26-65 | Magnetic Pick-Up Device |
| Dolphus H. Black | 3,169,379 | 2-16-65 | Cryogenic Storage Container with Inflatable Jacket Insulation |
| Willis G. Groth | 3,170,502 | 2-23-65 | Tube Flaring Machine |
| Robert L. Brown | 3,171,071 | 2-23-65 | Seam Follower |
| Fritz K. Pauli | 3,171,251 | 3-2-65 | Rotational Power Plant |
| Oscar C. Holderer | 3,174,335 | 3-23-65 | Wind Tunnel Seal |
| Hermann R. Wagner | 3,174,706 | 3-23-65 | Separation Device |
| Josef F. Blumrich | 3,175,789 | 3-30-65 | Landing Pad Assembly for Aerospace Vehicles |
| Oscar C. Holderer | 3,182,496 | 5-11-65 | Electric Driven Wind Tunnel |

| INVENTOR(S) | PATENT NO. | DATE OF ISSUE | TITLE OF INVENTION |
|---|---|---|---|
| Willis G. Growth | 5,185,023 | 5-25-65 | Optical Inspection Device |
| Roy E. Curry, Jr. | 3,189,794 | 6-15-65 | Relay Binary Circuit |
| Wilhelm Angele and Hans G. Martineck | 3,189,864 | 6-15-65 | Electrical Connector For Flat Cables |
| Robert J. Schwinghamer | 3,188,844 | 6-15-65 | Electrical Discharge Apparatus for Forming |
| Benjamin M. Saunders | 3,189,938 | 6-22-65 | Self-Latching Handle |
| William A. Schulze | 3,190,305 | 6-22-65 | Mixture Ratio Control Valve |
| Thomas L. Greenwood | 3,194,060 | 7-13-65 | Seismic Displacement Transducer |
| Herman F. Beduerftig | 3,194,439 | 7-13-65 | Vortex Cavity Seal Float |
| Dolphus H. Black | 3,197,087 | 7-27-65 | Fluid Transporting System |
| Karl Sendler | 3,197,775 | 7-27-65 | Doppler Tracking System |
| Robert J. Schwinghamer | 3,196,529 | 7-27-65 | Apparatus for Securing Objects Together |
| Emmett L. Martz | 3,199,931 | 8-10-65 | Externally Pressurized Fluid Bearing |
| Dale L. Burrows | 3,200,750 | 8-17-65 | Insulating Device |
| Hans F. Wuenscher | 3,202,381 | 8-24-65 | Recoverable Rocket Vehicle |
| Armand P. Lucchesi | 3,202,918 | 8-24-65 | Frequency Multiplier |
| Adolf L. Herrmann | 3,205,471 | 9-7-65 | Electrical Connector For a Pair of Circuit Boards |
| Robert J. Schwinghamer | 3,204,889 | 9-7-65 | Space Vehicle Electrical System |
| Everett W. Johnson | 3,207,523 | 9-21-65 | Seal Assembly |
| Josef Boehm | 3,208,293 | 9-28-65 | Low Inertia Actuator |
| Josef F. Blumrich | 3,208,707 | 9-28-65 | Pivotal Shock Absorbing Pad Assembly |

| INVENTOR(S) | PATENT NO. | DATE OF ISSUE | TITLE OF INVENTION |
|---|---|---|---|
| Wilhelm Angele | 3,209,187 | 9-28-65 | Printed Armature Device |
| William J. D. Escher | 3,208,132 | 9-28-65 | Method of Making a Multi-Walled Chamber |
| Robert L. Brown | 3,208,215 | 9-28-65 | Gimbaled, Partially Submerged Rocket Nozzles |
| Darrell E. Melton | 3,208,264 | 9-28-65 | Calibratable Pressure Responsive Actuator |
| Robert J. Schwinghamer | 3,210,842 | 10-12-65 | Method of Securing Objects Together |
| Lester Katz and Jack J. Nichols | 3,212,325 | 10-19-65 | Force Measuring Instrument |
| Robert J. Schwinghamer | 3,214,832 | 11-2-65 | Method of Magnetically Releasing Clamped Objects |
| Adolf L. Hermann | 3,215,968 | 11-2-65 | Printed Circuit Board Connector |
| Fritz K. Pauli and Rudolf H. Schlidt | 3,217,097 | 11-9-65 | Tethered Hovering Platform for Aerial Surveillance |
| Aubrey S. Drummond | 3,219,250 | 11-23-65 | Flexible Back-Up Bar |

L. D. Wofford, Jr.

cc:
PA, Mr. Jones
CC
DEP-A

VI

# MICHOUD ASSEMBLY FACILITY - HISTORICAL REPORT

January 1, 1965 - June 30, 1965

FIFTY YEARS OF PROGRESS

Both the one-horse wagon, photographed in 1915, and the 32 million-horsepower Saturn I rocket booster aboard its transporter in 1965, are shown passing the same aged chimneys that now frame the entrance to Michoud's Administration Building.

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LIST OF ILLUSTRATIONS

# CHAPTER I

## MICHOUD HIGHLIGHTS

> "While New Orleans slept Tuesday morning, its first home-produced Saturn zoomed into space. The launch of the Pegasus satellite by the Chrysler-built booster appeared as smooth as silk. Streaming rocket fire turned darkness over the Cape into an eerie, brilliant umbrella of light. The launch was at 1:35 a.m. New Orleans time under a clear starlit sky."

This quotation from the New Orleans TIMES-PICAYUNE of May 25, 1965, datelined Cape Kennedy, Florida, dramatically depicts the outstanding highlight of the Michoud Assembly Facility for the period January 1, 1965 through June 30, 1965.

This launching was the culmination of many months of steady progress in the S-I program. The S-I-8 was assembled and tested by the Chrysler Corporation Space Division at the Michoud Assembly Facility as one of the two remaining first stages to be launched in the Saturn I program. This booster was shipped to Cape Kennedy on February 22, 1965, where adjustments were made to correct discrepancies, and the SA-8 was launched on schedule, successfully placing Pegasus II into earth orbit on its mission of meteroid concentration detection.

Other operational milestones in the Saturn I/IB, S-I/IB Program included:

...Shipment of the S-I-10 to Cape Kennedy on May 26, 1965

...Successful static firing of the S-IB-1 at MSFC and return to Michoud on April 24, 1965 for post-static operations

...Shipment of the S-IB-2 to Huntsville on June 12, 1965, for static firing

...Clustering of the S-IB-3 on January 21, 1965, and commencement of pre-static test operations on this stage.

Highlights of the Saturn V - S-IC Program included:

...Assembly and delivery of a number of components for the S-IC-501, the S-IC-502, and the S-IC-S.

...Arrival of the S-IC simulator for use in checking out various Michoud facilities and docks, and for training personnel to handle the complete S-IC stage.

...Beginning of utilization of the Vertical Assembly Building, and assembly of the first verticallly assembled S-IC stage of the Saturn V.

Major facilities management activities during the reporting period included the letting of a contract for $1,964,879 for building a contractor services building at Michoud. The "L" shaped building will house several services, including medical, reproduction, fire, communication, plant protection, transportation and photographic departments. A contract was also let for paving of four parking lots covering approximately 11 acres, and construction of access roads and lighting facilities.

## CHAPTER II

## GENERAL

### A. Organization and Functions

1. No major organizational changes occurred during the period; however, internal reorganization of the Contracts Office was proposed and submitted in connection with the Tabaka Survey and the Human Resources Study. This reorganization established four sections, each reporting direct to the Contracting Officer:

Liaison and Facilities Branch

SI/IB Branch

SIC/SATV Branch

Plant and Technical Branch

2. In March 1965 the Contracting Officer issued a series of appointments of authorized representatives of the Contracting Officer for administration of contracts at the Michoud Assembly Facility.

### B. Key Personnel

1. Mr. M. Keith Wible, Assistant Manager, transferred to MSFC, Huntsville, in April 1965 and Mr. Marion S. Hardee, Contracting Officer, was appointed Acting Assistant Manager.

2. On March 22, 1965, Mr. Jack Byrd, Personnel Management Specialist, reported for duty, replacing Mr. Jack Brett, who transferred to Huntsville in May 1964.

### C. Public Affairs Activities

17,474 persons visited Michoud during the first half of 1965, and 285 tours of the plant were conducted.

D. Contractor Quarterly Reviews

1. Two Quarterly Reviews were held during this report period between Chrysler Corporation Space Division and the Michoud/MSFC Management. Both reviews were held in New Orleans.

2. Two Quarterly Reviews were held during the report period between The Boeing Company and Michoud/MSFC Management. The January review was held in New Orleans, and the April review in Huntsville.

## CHAPTER III

## PROJECT MANAGEMENT

### A. Saturn I/IB, S-I/IB Program

#### 1. Stage Operations

##### a. Key Operational Milestones

###### (1) S-I-8

The SA-8 was successfully launched from Cape Kennedy, placing Pegasus II into earth orbit on May 25, 1965. The SA-8 was launched at the scheduled time, with no "holds." The first stage of this vehicle, the S-I-8, had been beset with damages prior to shipment to the Cape; however, these were corrected. The fuel tank was damaged on February 11, 1965, by a Lift-a-Loft. This dent was pressed out. During inspection of S-I-8 prior to shipment to KSC, various scratches, dents, and gouges were found on the 1½", 4", and the suction line bellows. The 1½" GOX line had to be changed-out. The other damages were considered not critical, decision was made to use "as is," and the S-I-8 was shipped to Cape Kennedy on February 22, 1965. Adjustments were made at the Cape to correct such discrepancies as: damaged fuel pressurization switch, removal of tension ties, contamination of the hydraulic fluid, moisture problems with the helicon connectors, and missing "O" rings. Chrysler Corporation Space Division was granted three waivers on SA-8.

###### (2) S-I-10

Slight engine damage on S-I-10 was found during the installation of the insulation and was repaired with a saddle patch. Fuel tank #3 was found buckled after static testing, and the wrinkles were bumped out. Chrysler Corporation Space Division performed a satisfactory pressure test on the tank.

S-I-8 BOOSTER ENTERS BARGE FOR SHIPMENT

The S-I-8 Booster, the first Saturn I stage built at Michoud, is shown entering its special barge for shipment to Kennedy Space Center. The powerful Saturn I stage departed Michoud on February 22.

The S-I-10 was moved into Checkout Station #1 for post-static checkout on January 8, 1965. Engine #5 had excessive leakage past the LOX pump cavity seal. The seal was replaced and the disturbed systems verified. All other problems were of a minor nature and post-static checkout was completed on March 9, 1965. S-I-10 was shipped to the AMR on May 26, 1965.

Immediately following the removal of S-I-10 from Checkout Station #1, the station was completely modified to make it compatible with Checkout Station #2 and the S-IB Boosters. After modification, the station was completely re-verified utilizing the Ground Equipment Test Set (GETS).

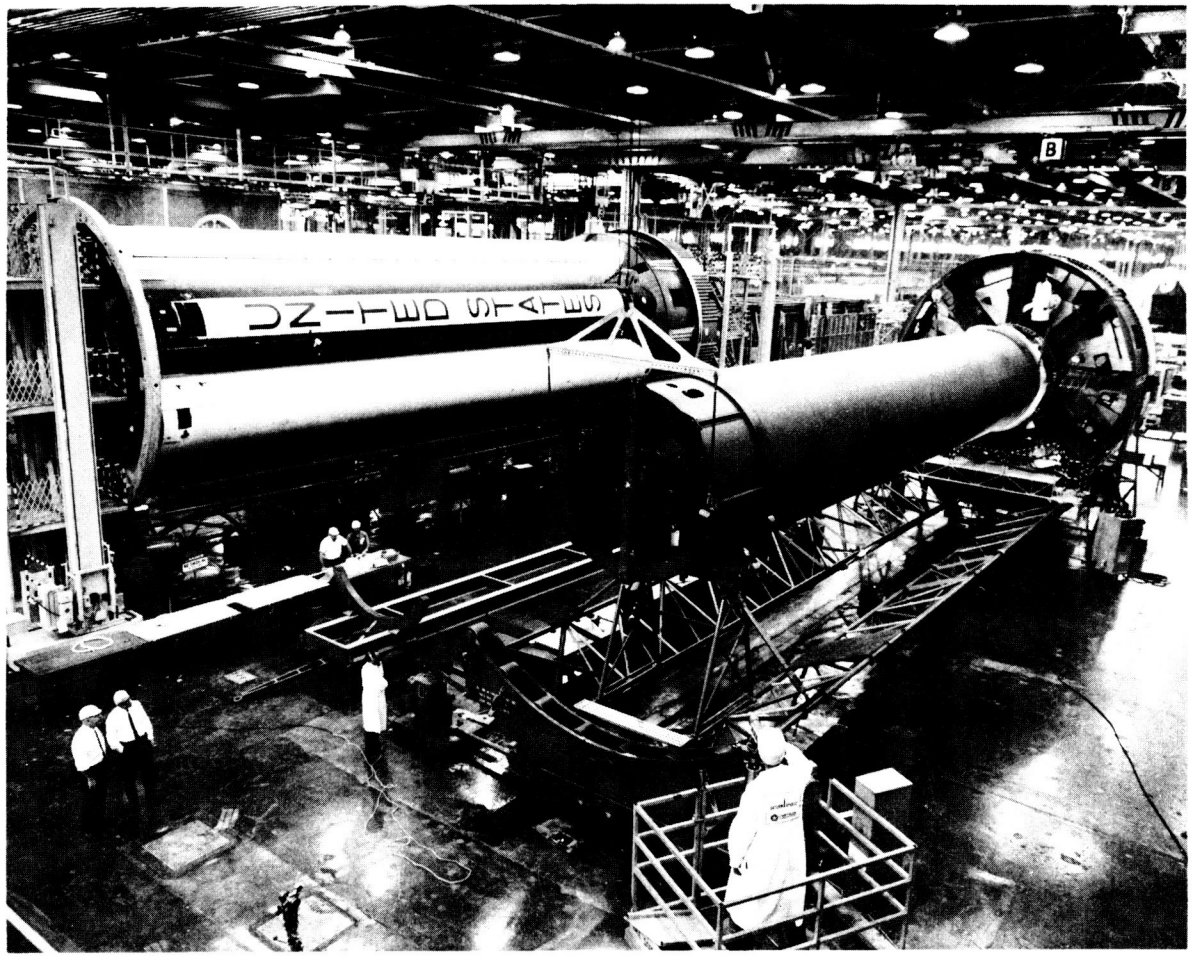
(3) S-IB-1

Pre-static checkout of Saturn Booster S-IB-1 was completed on February 3, 1965. Engines were installed immediately following checkout. It was shipped to the MSFC on March 6, 1965, for static firing tests, successfully static-fired, and returned to Michoud on April 24, 1965, for post-static modification and checkout. The booster was moved into the checkout area on June 11, 1965, and post-static checkout was approximately 70% complete at close of reporting period. No major problems were encountered during this portion of the checkout.

(4) S-IB-2

During the week of January 11, 1965, four inboard engine thrust chambers were found to be damaged after removal from S-IB-2 for shipment to Neosho for modification. The engines were repaired at the Neosho plant.

Saturn Booster S-IB-2 was assembled and moved into Checkout Station #2 for pre-static checkout on February 26, 1965. All eight engines were installed during the assembly phase but were removed prior to pre-static checkout for the LOX dome retrofit modification. Pre-static checkout,



S-IB-3 ASSEMBLY BEGINS

Chrysler personnel lowers the S-IB-3 105-inch-diameter LOX tank into assembly position. Eight 70-inch-diameter LOX and fuel tanks will be clustered around the massive center tank to form the booster. On the left is shown the S-IB-2 in final assembly.

accomplished without engines, was completed on April 22, 1965. No major problems were encountered. Engines were installed immediately following pre-static checkout.

On May 21, 1965, a large dent was found on the aspirator of an S-IB-2 engine. It was caused by a Lift-a-Loft. The engine was returned to Rocketdyne for repair. An investigating committee was formed to make a thorough search into the cause of this damage and make recommendations for corrective action. The booster was shipped to MSFC on June 12, 1965, for static firing tests.

(5) S-IB-3

Clustering of S-IB-3 was begun on January 21, 1965, and this booster was moved into Checkout Station #1 for pre-static checkout on June 17, 1965. Checkout is approximately 15% complete.

b. General

(1) During the S-IB second stage adapter qualification test on April 21, 1965, the LOX tank fitting on the spider beam failed between 100% and 110% of flight loads. On May 17, 1965, and May 24, 1965, additional tests to 80% and 50% of flight loads were conducted to determine the cause and mode of failure. On June 17, 1965, the spider beam, with appropriate engineering changes, was tested satisfactorily to 140% of flight loads.

(2) The MSFC Configuration Control Board controlled by the P&VE Laboratory was dissolved on January 1, 1965. In accordance with ANA 445, a military procedure, and NPC 500-1, Apollo Configuration Management Manual, configuration control will be exercised by the Saturn S-I/IB Configuration Control Board under the chairmanship of the S-I/IB Stage Manager in order to establish uniform configuration management methods and procedures throughout the Apollo Program.

(3) During the month of January 1965 the S-I/IB Operations Office made a technical evaluation of Chrysler Corporation Space Division's claims on Documentation Directives which covered a period through mid-November 1964. The negotiation with Chrysler Corporation Space Division had not been resolved at close of the reporting period. In order to prevent any further backlog of unnegotiated Documentation Directives, a procedure for conducting monthly negotiations on Documentation Directives was initiated at the suggestion of the S-I/IB Office.

(4) On March 9, 1965, approximately twenty-three Chrysler Corporation Space Division machine shop employees walked out on a "wildcat" strike. They were followed by approximately twenty-three tool room employees and approximately sixteen millwrights. On March 10, 1965, all workers reported to their jobs; however, the machinists and tool room employees again walked off followed by eleven production employees. Apparently the strike was due to Chrysler Corporation Space Division hiring a "job setter" to whom the machine shop operators objected. The others walked out in sympathy with the machine shop employees. CCSD and the Union reached an agreement through negotiation.

2. Quality Assurance and Reliability

a. During this period, review and evaluation were performed on adequacy of and compliance with the S-IB contractor's Quality Assurance Program. Manufacturing process paper was reviewed for quality requirements and mandatory NASA inspection for vehicles S-IB-2, 3, 4 and part of S-IB-5. Test procedures which were changed due to redesign were reviewed and approved.

b. Unsatisfactory Condition Reports generated on S-I-8 at KSC, S-I-10 at Huntsville and S-IB-1 at Huntsville, were investigated and corrective action taken. Several trips were made to suppliers of the S-IB contractor

to resolve quality problems. Some of these vendors were: (1) Parker Aircraft, (2) Cadillac Gage, (3) Automation Industries, (4) Gulton Industries, and (5) Applied Microwave.

c. Reliability Program Plan REL-10 was revised and updated and will be reissued as Revision B. A reliability program survey was conducted and questionable areas examined. Updating of the reliability math model shows a reliability of 99.2% (7 engine mission requirement) and 95.3 (8 engine mission requirement) for S-1B-1. Training Course III, "Reliability Analysis for Design," was completed. Initial surveys of all critical suppliers have been completed; resurveys are in process. The Human Factors Engineering Group has written 29 reports which have resulted in several improvements. The Data Center produced the final QSL for S-1 stages and are producing individual QSL's for S-1B stages with a revised format. Under the Manned Flight Awareness Program, arrangements were made for an astronaut to visit the Michoud Assembly Facility and a CCSD representative was selected to be sent to the Cape to observe the launching of SA-8.

d. All S-1 hardware test reports were received and distributed. The addition of qualification testing of hardware to the revised environmental specifications necessitated a revision to the reliability test schedule. Twenty S-1B items started test and eight were completed. Phase IV of the high pressure test facility was approved and construction begun. This phase provides a high and low temperature high flow test facility.

3. Contracts

a. NAS8-4016

(1) Chrysler Corporation Space Division Contract NAS8-4016 was modified and increased in value during this report period in the amount of $17,406,859. This increased the total contract value (through Mod 213, excluding Mods 205 and 206) from $317,262,198 to $334,669,057 (includes $6,149,166 C of F). The $17,406,859 increase provided the following:

(a) $77,247 - Prototype Auxiliary Hydraulic Drive System

(b) $75,676 - Acceptance Test or Launch Language (ATOLL)

(c) $167,897 - Component Qualification Test Program - Emergency Detection System

(d) $45,512 - Additional Equipment Requirements for GETS Checkout of Networks Test Station

(e) $457,277 - Contractor furnished equipment for the second Quality Control Telemeter Ground Station

(f) $1,025,844 - Dynamic Test Program

(g) $886,741 - Design, modification and maintenance of S-IB Electrical Support Equipment

(h) $150,564 - Saturn IB/Minuteman Two (2) Month Study Program

(i) $8,775 - Repair of GFP

(j) $21,787 - Connecting hardware for Saturn IB Vehicles 201 through 212 and 200 D/F

(k) $2,734,560 - Saturn I/IB documents

(l) $40,795 - Weight and Balance Log

(m) $369,638 - Reprogramming MSFC Computer Programs to the FORTRAN IV Language

(n) $757,983 - Increased man-hours for Item II, Direct Engineering Support to MSFC by 150,992

(o) $36,418 - Qualification testing of two (2) auxiliary hydraulic pumps

(p) ($15,271) - Deleted requirement to water calibrate the propellant containers on the S-IB Stage

(q) $37,662 - Maintenance of Mechanical Interface Control Documents for Saturn 200D and 200F Vehicles

(r) $15,958 - Repair and Modify Packard Bell Instrumentation and Telemetry Test Station and Packard Bell Networks Test Station

(s) $400,847 - Reliability Demonstration Test Program

(t) $216,982 - Emergency Detection System for S-IB Stages and furnish emergency detection system test distributors

(u) $151,384 - C of F Plant Modification (Item I) - Additions and Modifications to Existing Facilities

(v) $639,130 - Documentation Saturn/Apollo Program

(w) $296,861 - Recoverable Cameras (2 each) for S-IB-1, 2, and 3 Stages

(x) $24,707 - Repair and/or modify Government Furnished Special Tooling - S-I-8 Components

(y) $271,091 - Documentation Directives

(z) $60,023 - Saturn IB SDBF Instrument Unit Cooling System

(aa) $880,411 - Extend Aeroballistics Program (Item IIIb) and Saturn IB/Centaur Wind Tunnel Testing and related work through September 1965

(bb) $687,324 - Maintain design and documentation work for Saturn I Electrical Support Equipment

(cc) $555,774 - Saturn IB Mechanical Ground Support Equipment Data

(dd) $490,929 - Extend Logistic Spares Support (Item V) through September 1965

(ee) $4,222,740 - Operation and Maintenance of Saturn I/IB Systems Development Breadboard Facility

(ff) $67,766 - Documentation prior to S-I/IB Stage Shipments

(gg) $691,077 - Structural Analysis

(hh) $194,750 - Computer Program for S-IB Propulsion System

(ii) $660,000 - Accoustic testing forward fuel skirt, Phase I Apollo test requirements Tank Breather System, Master Hole Location Template, DD #409, Instrumentation Engineering Tasks, Launching Information Document, System Design Test and Checkout Requirements, Document for S-IB-D/F Stage, Rocketdyne Work Orders, Procurement LOX Suction Line, Cracked Captive Firing Bracket

(2) Mod 205 was under negotiation at the close of the reporting period. This covers finalization of various change orders.

(3) Negotiations were completed on June 18, 1965, for CCSD to provide a mission to perform designing, developing, testing and provisioning of Mechanical Ground Support Equipment. This negotiation will add approximately $4,152,717 to the estimated cost of Contract NAS8-4016 under Modification No. 206.

(4) On April 22, 1965, negotiations commenced on Chrysler Corporation Space Division Proposal MC-22 for an equitable adjustment to Contract NAS8-4016 resulting from NASA Program Redirection and termination of six (6) stages. Negotiations were completed with exceptions of General and Administrative and fee adjustments. It is anticipated that a settlement will be reached before July 9, 1965, resulting in a credit to the contract of approximately $28,000,000.

(5) Item IV, Launch Support of Contract NAS8-4016, was completed on January 31, 1965, with the missionization and successful negotiation of this activity between KSC and CCSD.

(6) Chrysler Corporation Space Division was advised on March 31, 1965, of a revised delivery schedule for S-I/IB-1 through 12. The net result of the new schedule was a one month delay in delivery of S-I/IB-1 through 8 from the previous schedule and no change in S-I/IB-9 through 12.

(7) Chrysler Corporation Space Division was advised on April 16, 1965, of a delivery schedule change for Vehicle S-I-10 from June 9, 1965, to June 1, 1965, and S-IB-1 from September 15, 1965, to August 15, 1965.

(8) Chrysler Corporation Space Division was advised on June 22, 1965, that all reasonable and allocable cost, not in excess of $200,000 incurred subsequent to June 22, 1965, in the performance of Saturn IB Mechanical Ground Support Equipment shall be allowed. The supplemental agreement is under preparation as the result of completed negotiations and will be forwarded to NASA Headquarters for approval.

(9) A Request for Proposal was issued to Chrysler Corporation Space Division on June 8, 1965, to convert Cost-Plus-Fixed-Fee Contract NAS8-4016 to a contract with an incentive arrangement. A reply is expected by July 23. The current schedule calls for conversion by October 8, 1965.

(10) Fiscal Year 1965 funding of Contract NAS8-4016:

(a) Incremental R&D funding during this report period against FY-65 requirements was $4,109,164 for a Fiscal Year 1965 total of $71,987,852.

(b) Incremental R&D funding during this report period against FY-66 requirements was $13,176,000.

(c) C of F funding for Plant Modification was increased by $151,383 during this report period for a total FY-65 funded amount of $291,383.

b. NAS8-5602(F)

Chrysler Corporation Space Division Contract NAS8-5602(F) for facilities equipment to support the S-I/IB program reflected no change in contract value during the reporting period. However, the contractor was authorized to procure $20,198 of facilities equipment for support of the development of Breadboard Facility. This equipment was substituted for other facilities equipment previously planned.

4. PERT

a. Chrysler Corporation Space Division implemented two new networks during this report period. Implementation dates were: S-IB-6 - March 1965, Structural Qualification Test - March 1965. The S-I-8 PERT Network was completed on March 11, 1965, with arrival of the Booster at KSC on February 28, 1965, as scheduled. The S-I-10 PERT Network was completed on June 3, 1965, with arrival of the Booster at KSC on May 31, 1965, as scheduled.

b. PERT schedule assessment at the close of this report period forecasts Vehicle S-IB-1 and S-IB-2 to be delivered on schedule. Vehicles S-IB-3 through S-IB-6 range from one to seven weeks behind schedule, caused primarily by late vendor parts deliveries. Expedited parts deliveries and increased manpower is being utilized by CCSD in order to insure on-schedule vehicle deliveries.

c. CCSD PERT Networks as of the end of this report period contain a total of approximately 4,000 activities against which bi-weekly schedule is being made.

B. Saturn V - S-IC Program

1. Stage Operations

a. S-IC activities during this 6-month period included the assembly and delivery of the following items to MSFC:

(1) Thrust Structure for S-IC-501

(2) Forward Handling Ring for S-IC-501

(3) Intertank for S-IC-501

(4) Forward Skirt for S-IC-501

(5) Stage Electrical Cables and Instrumentation for S-IC-501

(6) The two (2) remaining "Y-Rings" for S-IC-502

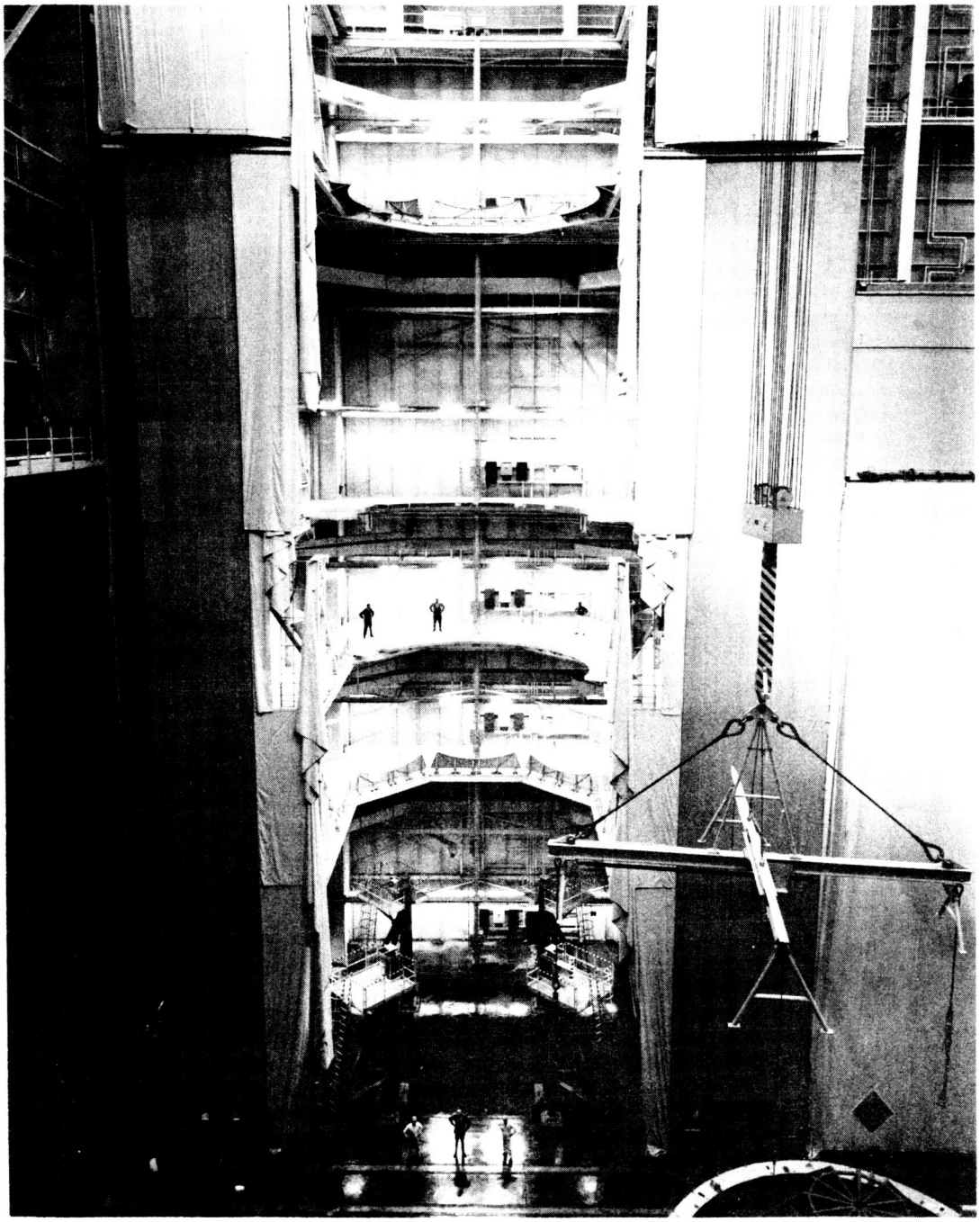
(7) Forward Skirt for S-IC-S

b. The Thrust Structure for S-IC-502 was approximately 95% complete as of June 30 and arrangements were being made for its delivery to Huntsville in July.

c. Vertical assembly of the S-IC-D Vehicle at Michoud was completed, removed from the Vertical Assembly Tower to the transporter, and moved into the Horizontal Installation area.

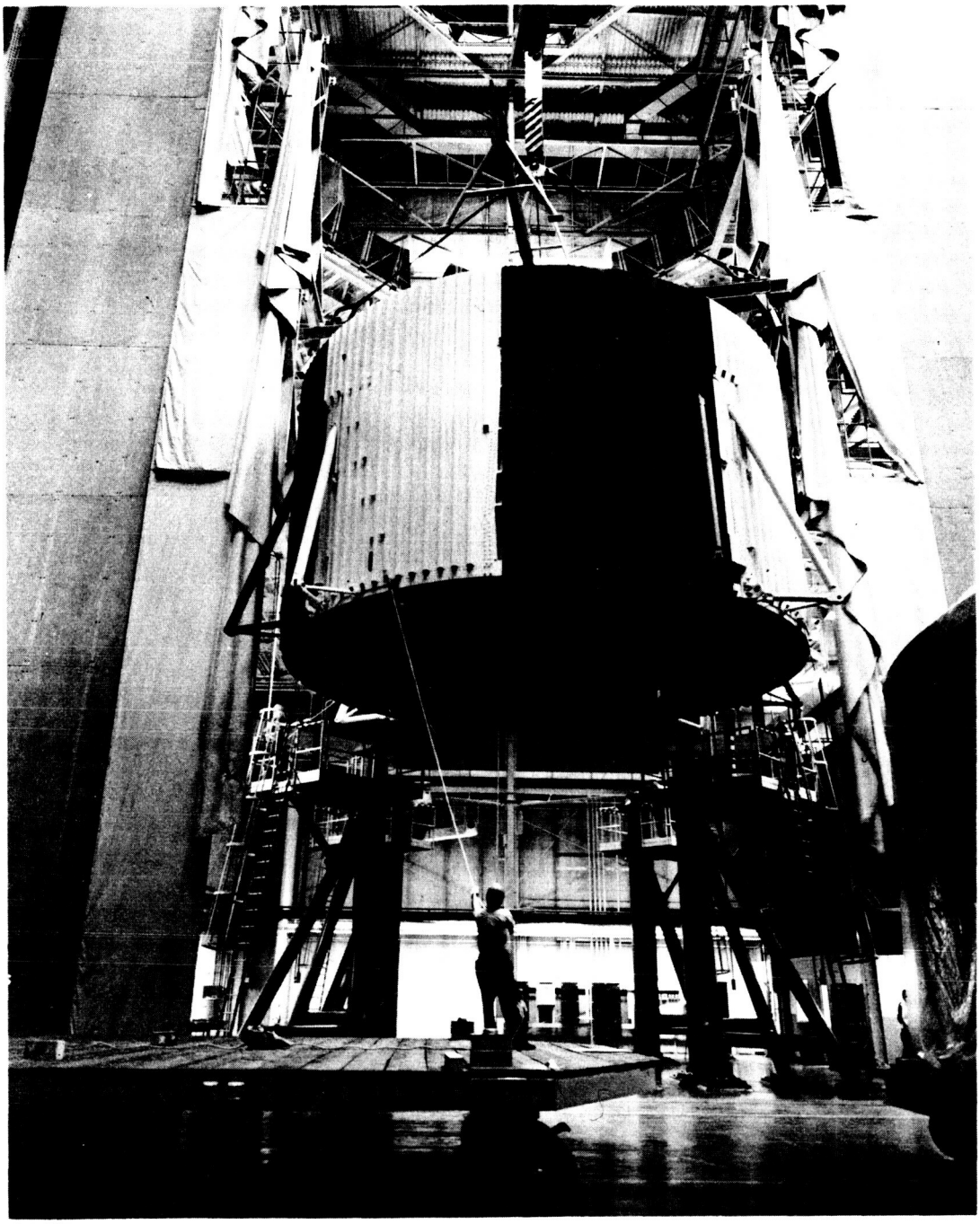
d. The Thrust Structure for S-IC-F Vehicle was moved into the Major Paint area for painting. The Fuel Tank for the F-Vehicle was completed and moved into the Hydrostatic Test Position. The LOX Tank required the installation of remaining baffles and the close-out weld operation.

e. All "Y-Rings" for the S-IC-503 Vehicle were completed and tooling was prepared for the change-over to manufacture of the T-Stiffened Y-Ring. The Thrust Structure was approximately 20% complete and all bulkheads and skin sections were fabricated for this vehicle.



INTERIOR OF VERTICAL ASSEMBLY BUILDING FOR S-IC BOOSTER ASSEMBLY

S-IC stages will soon take shape in this 150-foot-tall assembly bay located in the 215-foot-tall VAB at Michoud. Personnel in this photograph were positioned to lend scale to the towering assembly bay.



S-IC THRUST STRUCTURE LOWERED INTO VERTICAL ASSEMBLY POSITION

A 33-foot-diameter thrust structure is lowered into the VAB as assembly of the first S-IC stage begins. The 90,000 pound corrugated tail section will support the booster's five F-L engines. Assembled on top of the thrust structure will be the fuel tank, intertank, LOX tank, and forward skirt assembly.

2. Quality Assurance and Reliability

a. During this period, review and evaluation of the S-IC Quality program continued and assistance was given to improve the contractor's quality effort. Manufacturing processes were reviewed for quality requirements and mandatory NASA inspection determined. Functional test procedures used in-house were reviewed and approved and evaluations were made to assure that vendor test procedures and those used in-house were compatible.

b. Extensive activity took place to improve the quality of items being supplied to the S-IC contractor by outside vendors. The major problems were LOX cleaning, soldering, design which meets MSFC requirements and adequate functional test procedures. Trips were made to numerous S-IC vendors to discuss quality problems with the Government Source Inspectors and the vendors.

c. Quality Engineering personnel assisted R-QUAL and the S-IC contractor in the delivery of R-QUAL GSE. This, in many cases, required work-around methods and elimination of lower level testing in order to shorten flow time of items. Assistance was also rendered the S-IC contractor in the incorporation of CAM's for the R-QUAL GSE and the delivery of R-TEST GSE.

d. All of the welding operations performed in the subassembly area were certified. Weld certification continued in the Vertical Assembly Building. A new technique for leak detection during hydrostatic testing of the S-IC fuel and LOX tanks was evaluated and approved for use. This eliminates the use of dye and uses a water sensitive tape which changes electrical conductivity should it be exposed to water. This was used for acceptance of the "F" fuel tank and saved time and prevented problems in cleaning of the tank.

e. The Boeing Test and Checkout Building was completed with the Boeing Company achieving joint occupancy on March 5, 1965. Installation of Manufacturing Support Equipment (MSE) has begun with Control Room #2 approximately 70% complete.

f. The first of three RCA-110A Computers scheduled for use in the Boeing Test and Checkout Building was installed in Computer Room #2 on May 10, 1965. The second computer is scheduled to arrive on July 2, 1965.

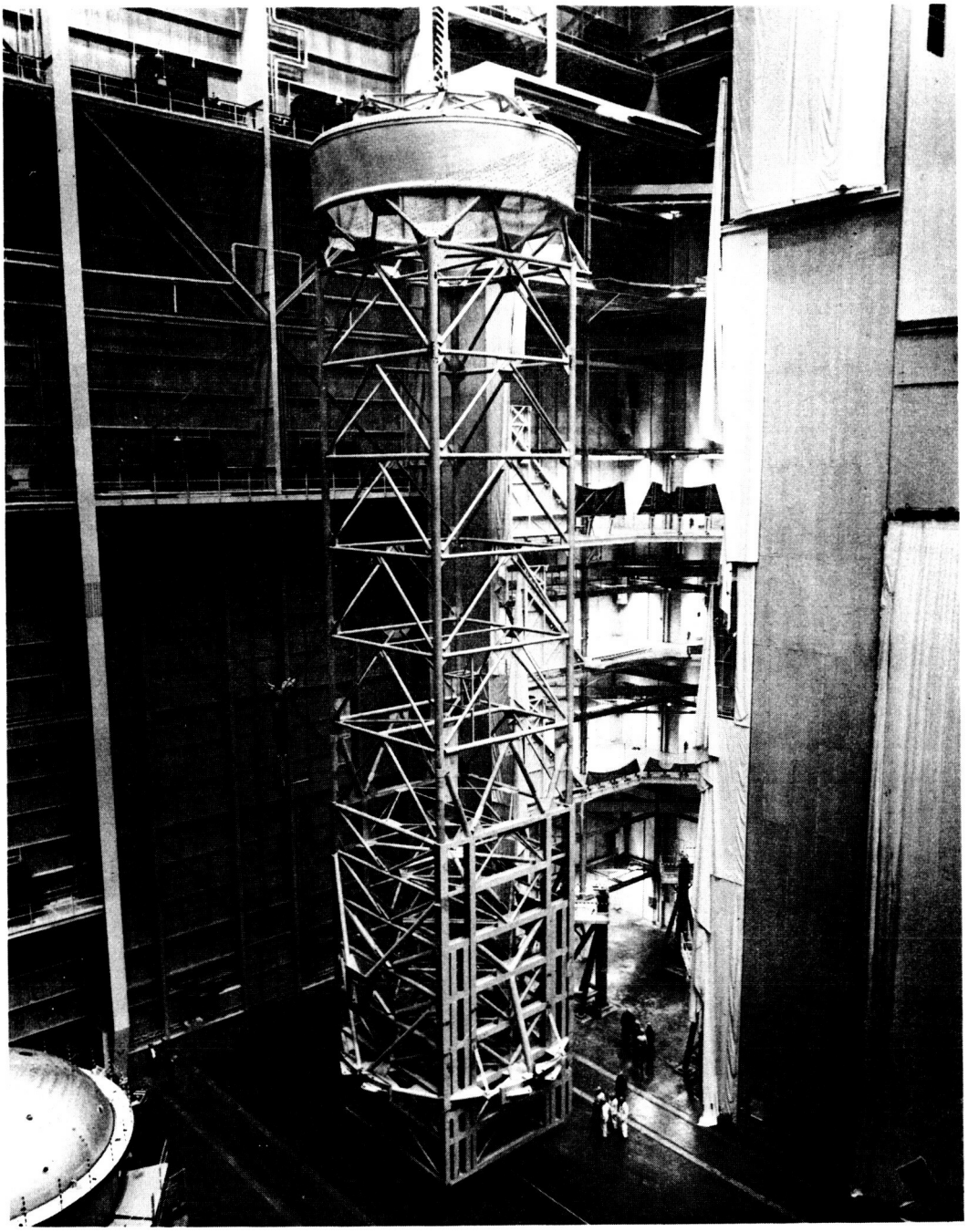
g. Saturn Booster S-IC-D, first of the S-IC boosters to be assembled at Michoud, was moved from the Vertical Assembly Building (VAB) to the final, horizontal, assembly area on June 27, 1965.

h. The S-IC Reliability Program Plan, D5-11013, was revised by Boeing and approved June 21, 1965. The plan is now recognized as an accurate description of planning for the S-IC Reliability Program.

i. A letter to the Boeing Company, dated October 14, 1964, brought attention to the gross deficiencies existing in the contractors qualification test program and asked for corrective action.

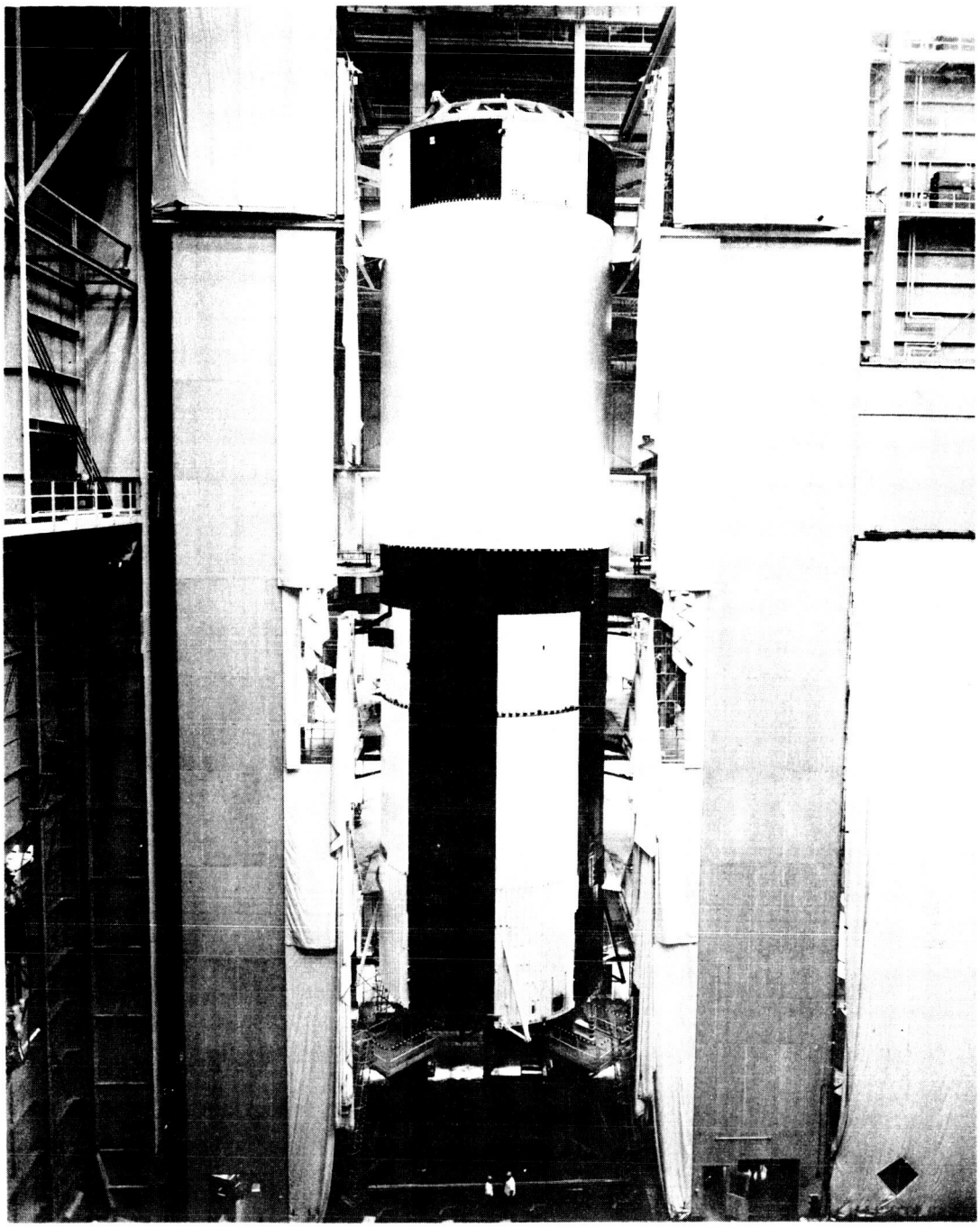
j. Research and documentation was completed in support of the Space Technology Panel of the Presidential Scientific Advisory Committee (PSAC). A comparison between the S-IC and Minuteman reliability programs was made at PSAC's request to assist the committee in evaluating the Boeing reliability effort.

k. Extensive and detailed meetings were held during the period to discuss costs, requirements, approaches, etc., to the Qualification and Reliability Test programs under Contract Modification 92. Contract negotiations were suspended in June 1965 due to the gross difference in contractor's proposed cost and the Government's estimated cost. It was decided to write a new scope of work and issue a new modification for a total test program in an effort to obtain more reasonable pricing.



CHECKOUT OF VAB

A steel framework model simulating the weight and dimensions of the S-IC stage is positioned in the S-IC VAB at Michoud during a checkout of of facilities, equipment, and handling procedures.



FIRST VERTICALLY ASSEMBLED S-IC STAGE

The first vertically assembled S-IC stage at Michoud towers over technicians. This initial booster, designated S-IC-D, is a ground test stage which will be used in dynamic tests of the Saturn V vehicle.

l. The "Parts Program Plan" for S-IC, D5-11372, was reviewed and approved. Implementation progressed very well. Released drawings were being reviewed in an attempt to screen out any unreliable parts. Boeing took internal action to control parts in new procurements from suppliers.

m. "Saturn S-IC Stage Reliability Analysis Record," Document D5-11954-1, was forwarded to MSFC for review. This document presented reliability goal allocations and results of flight simulations of systems and subsystems. Fifty thousand computerized flight simulations for the Propulsion/Mechanical System and twenty thousand computerized flight simulations of the Flight Control System were reported with resulting reliabilities of 0.9892 and 0.9882 respectively.

n. Updatings of the S-IC Design Analyses, D5-12572-1 and -2 for the Propulsion/Mechanical, Ordnance and Destruct, and Operational Electrical Systems were completed by the contractor. Boeing's revised "Design Analysis of S-IC-1 Malfunction Detection System," D5-12789, was also received. This analysis traces each component failure to end result in order to make recommendations for the Emergency Detection System (EDS) monitoring parameters.

o. The S-IC Program Manager advised The Boeing Company that GFE hardware would not be furnished specifically for Equipment Quality Analysis.

p. A survey of reliability and quality reporting was completed at the request of the Saturn V Office. This is a reporting system whereby all NASA contractors would report immediately any part or material problem. NASA, upon receipt of such reports, distributes them to all other Apollo program contractors who may be concerned. By expeditiously exchanging such information with contractors and other NASA centers, considerable cost savings would result in the elimination of error repetition and defective parts and material.

3. Contracts

a. NAS8-5608

(1) The S-IC Program, Contract NAS8-5608, The Boeing Company, had a contract value of $608,282,972 at the end of December 1964, and during January through June 1965 this was increased by $68,313,599 to a contract value of $676,596,531. During January/June 1965, 129 modifications to the contract were issued. The $68,313,559 increase provided the following:

(a) $581,000 - Change S-IC-D Mock-up to reflect S-IC-T Configuration.

(b) $6,574,954 - Saturn V Launch Vehicle Ground Support Equipment Management and System Program (Schedule II).

(c) $648,812 - S-IC-T Vehicle Design Criteria.

(d) $703,024 - Human Engineering.

(e) $2,915,024 - Saturn V Launch Vehicle Integrated Functional Subsystems Reports (Schedule II).

(f) $3,135,977 - Saturn V Dynamic Test Vehicle Phase I Test Program (Schedule II).

(g) $539,111 - Investigation of Corrosion Protection Methods Associated with Saturn S-IC Stages.

(h) $4,822,266 - Increase Part IX Manufacturing Support to MSFC.

(i) $8,111,166 - Saturn V Mechanical Ground Support Equipment Program (Schedule II).

(j) $398,248 - Support to MSFC Quality and Reliability Assurance Laboratory.

(k) $1,653,479 - (includes $14,300 C of F) - Procure, fabricate, install, test, check, and calibrate a Mechanical Automation Breadboard.

(l) $109,011 - Impedence Measurements of F-1 Engine on Engine Stand at MSFC.

(m) $30,685 - Repair of Hoisting Tool.

(n) $5,289 - System Analysis on Removal of the S-IC Stage Static Firing and Flight Heat Shields.

(o) $46,943 - Rocketdyne Facility in the S-IC Area.

(p) $57,533 - Engine Documentation - Delete Technical Handbook for S-IC-T Vehicle.

(q) $416,350 - Digital Event Evaluator - RCA 110A Input/ Output Data Channel.

(r) ($59,066) - Deletion of EBW Firing Units.

(s) ($42,361) - CAM 206.

(t) $549,000 (C of F) - Component Test Facility.

(u) $471,757 - Revisions to System Engineering and Integration Support (Systems and Design Engineering - Telemetry Systems) (Schedule II).

(v) $4,999,850 - Computer Support Costs for Schedule II.

(w) $95,871 - Saturn V Systems Development Breadboard Facility (Schedule II).

(x) $22,992,639 - Incorporation of Plan VII

(y) $25,650 - Test Panel Intertank Assembly.

(z) $796,505 - Servo-Actuator Analysis and Test Program.

(aa) $2,418,803 - Manufacturing Support to MSFC.

(bb) $257,734 - S-IC Int. Tank Access Equipment

(cc) $5,058,305 - C.O.'s 87,128 (except certain C.A.M.'s)

(2) A Supplemental Agreement was negotiated on March 15, 1965, with The Boeing Company to establish a revised numbering system subsequent to Mod 248 and identified as I-1, etc., for contract modifications to Schedule I (subsequently revised again on April 1, 1965, and identified as I-MICH-1, etc.) and establish a composite Contract Schedule I unofficial working document. The revised system will contain two parts; one part will contain the legally contractual modification and the second part the unofficial revision pages to the composite contract working document. The revised numbering system also separated Schedule II activity and Contract Modifications will be identified as MSFC-1, 2, etc.

(3) A Supplemental Agreement was signed on March 26, 1965, incorporating a new delivery schedule referred to as Plan VIII (NASA designation MA-2) and extending the period of performance through April 8, 1969.

(4) On March 19, 1965, direction was received to proceed to convert Cost-Plus-Fixed-Fee Contract NAS8-5608 to Cost-Plus-Incentive-Fee by December 31, 1965.

(5) Fiscal Year 1965 funding of Contract NAS8-5608 was as follows:

(a) Incremental R&D funding during this report period against FY 65 requirements was $42,391,324 for a Fiscal Year 1965 total of $250,288,846.

(b) C of F funding for Plant Modification was increased $268,798 during this report period for a total FY 65 funded amount of $617,827.

b. NAS8-5606(F)

The Boeing Company Contract NAS8-5606(F) for facilities equipment to support the S-IC program was increased by $2,699,067 to a revised total of $21,735,428. The contract value increase of $2,699,067 was also funded in the same amount for this report period.

c. The NASA Defense Purchase Request issued to Headquarters, Arnold Engineering Development Center, was decreased $67,200 during this report period because of a reduction in the scope of testing as originally authorized.

4. PERT

a. The Boeing Company implemented two new networks during this report period. The implementation dates were: Reliability Program & Structural Test - February 1965.

b. PERT schedule assessment at the close of this report period forecasted S-IC-D, the first vehicle to be assembled at Michoud, to be two weeks late to schedule. The current pacing item is Completion of Acceptance Test Procedures for Stage Checkout. The S-IC-F and S-IC-3 Vehicles are forecasted to be nine weeks late to schedule and are being paced by GSE Equipment Calibration procedures required for Stage Checkout. Boeing is currently rephasing the requirements for these procedures in order to maintain schedule.

c. The GSE for MSFC is forecasted to be from 16 to 20 weeks late to schedule. Numerous CAM actions impacting modification of equipment which interface with the S-IC Stage is the pacing problem. Boeing indicates modifications resulting from CAM actions will be incorporated during "Shut-Down" periods in order to meet schedule.

d. Boeing PERT Networks as of the end of this report period contain a total of approximately 13,000 activities.

C. Engine Office

1. During the six-month period from January 1, 1965, to July 1, 1965, all S-IB-1 and S-IB-2 engines were returned from Neosho with the new high performance injector and other 200k modifications. All S-IB-3 engines were delivered ahead of schedule. Engine damage during this report period became a major concern. A number of procedure changes and additions were instigated in an attempt to alleviate this problem.

2. A decision to uprate the H-1 engine, later rescinded caused a schedule slip in engines for S-IB-6. The full impact of this slip will not be known until the next report period.

3. Contamination in the S-I-8 engine gas generators resulted in a crash program to remove, return to Michoud, clean and re-install prior to launch. This was completed without a delay to the launch schedule. All engines performed as expected during the successful launch of S-I-8.

4. All GSE necessary to receive F-1 engines was on hand, proof loaded, and/or functionally checked.

5. During this period FM-105, its thrust chamber extension and associated loose equipment arrived at Michoud Assembly Facility. This mockup F-1 engine has been very helpful in familiarizing Boeing personnel with various engine handling and in-plant transportation equipment.

6. Contract Modification #233 was approved, giving Boeing contractual go-ahead to move out on the procurement and/or fabrication of some 26 items necessary for engine checkout and handling.

7. The contract was signed for construction of the F-1 Component Maintenance and Repair facility, Rocketdyne office, and warehouse in the plant.

8. Final signoff of the NASA, Boeing, and Rocketdyne working relationship agreements for Michoud and MTF was obtained. (Documents D5-12859 and D5-12859-1, respectively.)

9. The Boeing proposed F-1 Engine Checkout Procedure and F-1 Engine Handling Procedure documents were reviewed and comments were submitted.

D. Documentation

1. The Boeing Company's automatic data processing system for engineering documentation was revised on January 8, 1965, to adjust system logic and to satisfy a request for additional information in the reporting system.

2. A MSFC/Boeing study was initiated in this reporting period to change the automatic data processing system of reporting from a master record of all vehicles to a generation breakdown of each vehicle. A generation breakdown is composed of (a) indentured parts list that denotes the quantity of parts per assembly and the status of that assembly; and (b) cross-reference listing which is an index to the indentured parts list that gives the total quantity of parts required for each vehicle. This study was aimed at reducing the number of published reports.

3. The Engineering Documentation covering S-1-8 was air-expressed to the Cape on February 23, 1965, and was accepted by CCSD personnel for distribution to the various elements at the Cape. The Engineering Documentation covering S-1-10 was air-expressed to the Cape on May 25, 1965, and was also accepted by CCSD personnel for distribution to the various elements at the Cape.

4. The Documentation Office initiated cost reduction programs in engineering reproduction and microfilming of released documentation.

The most significant program was the reducing of all "E" thru "J" size drawing prints to one-half size, thus greatly reducing the cost of supplies, handling, and distribution.

5. Basic Engineering was almost completed for the S-IC Stages. Release of GSE/MSE basic documentation is approximately 99 percent complete.

6. The Change Action Memo (CAM) flow procedure for processing significant engineering design changes was streamlined to obviate the requirement for the S-IC State contractor to submit the original CAM for MSFC approval signatures and to allow the S-IC Stage contractor to proceed with implementation of non-negotiable CAMS based on submittal of the CAM to MSFC in lieu of an approval signature.

7. A Part I and II Contract End Item (Prime Equipment) Specification for a S-IC Stage flight configuration was created during this period.

8. The initial exercise to determine the required documentation to be submitted to MSFC by the S-IC Stage Contractor began. This action is the first step toward a centralized data management concept and is defined by NPC 500-6 "Apollo Documentation Administration Instruction."

9. The S-IC-D Stage "Minimum" configuration was defined by The Boeing Company Document D5-11978-1.

# CHAPTER IV

# SUPPORT ACTIVITIES

## A. Contracts

### 1. NAS8-14017

The Support Services Cost-Plus-Award-Fee Contract NAS8-14017 with Mason-Rust was negotiated during the week of February 1, 1965, and approved by option for three additional one-year periods. The estimated cost was $10,934,377, with a Base Fee of $109,343 and a potential Maximum Fee of $656,062. Incremental FY 65 funding in the amount of $4,498,355 was provided during the reporting period.

### 2. NAS8-5618

Mason-Rust Contract NAS8-5618 was modified and increased in value during the report period in the amount of $1,891,329. This increased the total contract value (through Mod 36) from $17,869,690 to $19,761,019. The $1,891,329 increase provided the following: $1,957,344 - For extending the period of performance from January 1, 1965, through February 28, 1965. ($66,015) - For deletion of projects 59, 61, and 62 from Appendix "K." Incremental FY 65 funding in the amount of $1,187,726.12 was provided during the report period for a total contract funding of $19,023,788.12. Of this amount, $8,065,699.12 was funded during FY 65.

### 3. NAS8-4019(F)

Mason-Rust Contract NAS8-4019(F) for acquisition and accountability of Government Furnished Property was increased by $484,303 to a revised contract total of $2,170,963. Funds were provided for the contract increase and the contract was fully funded at the close of this reporting period.

### 4. Other

During this report period, funds were provided for the following in support of Michoud Operations:

a. $609,000 - Utilities for a total FY 65 amount of $1,269,000.

b. $162,000 - Communications for a total FY 65 amount of $1,045,000.

c. ($4,205) - Packing, Crating and Handling for a total FY 65 amount of $5,795.

d. $40,000 - Navy Printing for a total FY 65 amount of $90,000.

e. $7 - M52 Truck Tractor repair parts. The $100 authorized for technical manuals will be withdrawn early in the first quarter FY 66. NASA Headquarters has taken the responsibility for funding these manuals.

f. ($148.10) - This adjustment was made in the NASA Defense Purchase Request issued to Brookley Air Force Base for Calibration of Test Equipment at Computer Operations Office based on final billings received. Total cost for FY 65 was $2,851.90.

g. ($2,738) - Equipment to Support AE Design Contracts. This decrease is an obligational adjustment to agree with the actual negotiated price. Total cost for FY 65 is $6,902.

h. ($50) - LSU Economic Study - Total cost for FY 65 is $7,520.

i. $10,711 - Gasoline GFP to Mason-Rust under Contract NAS8-14017.

j. $1,887.05 - RJ-1 Fluid GFP to The Boeing Company under Contract NAS8-5608.

k. $181,850 - For design, Title I shop drawing services, Title II inspection services and construction of cafeteria, Computer Operations Office, Slidell, Louisiana (Michoud Project 15).

l. $14,879.41 - Federal Telecommunications System circuits terminating at Michoud Operations.

m. $11,444.14 (AO) - For Title II services and additional costs of construction resulting from change items for modification to the air conditioning system, Central Computer Facility, Slidell, Louisiana.

n. $6,000 - Armour Research Foundation.

B. Safety

1. Mission SAFETY-70

The President's program for reducing federal injuries and accidents by 30% by the year 1970 (designated by the Department of Labor as "Mission SAFETY-70") was instituted at Michoud Operations in April of this year. In conjunction with the Mission SAFETY-70 overall program, reports, statistics, and application, Mr. G. D. McCauley, NASA Safety Officer, Headquarters, Washington,D.C., visited this installation in May of this year. Mr. McCauley recommended the inclusion of the Chrysler Corporation Space Division, the Mason-Rust Joint Venture, The Boeing Company Launch Systems Branch, and Telecomputing Services, Inc., as active participants in the Mission SAFETY-70 program. It was recognized by Mr. McCauley and the Safety Officer of Michoud that the President's program is directed toward federal (i.e., Civil Service) employees and the participation of industry in any place or under any conditions would be purely voluntary; however, the response from these organizations was wholehearted and gratifying.

2. Safety Program

a. Additional Michoud Operations Instructions implementing the Safety Program were prepared during the reporting period. Also, a number of revisions to previously published Michoud Instructions were prepared and disseminated.

b. The Safety Officer of Michoud Operations was appointed Technical Monitor for Safety, Fire Prevention, and Medical protions of the new Cost-Plus-Award-Fee contract negotiated between NASA and the Mason-Rust Joint Venture.

c. A management improvement was instituted in the reporting procedure for injuries both minor and major, physical and visual examinations, and pre-employment examinations at the Medical Department. This improvement consisted of the design and application of the "Injury and Medical Report." This one report form replaces eight other previously used forms of various sizes and descriptions all pertaining to the same basic use; i.e., injury and medical reporting and dispensary pass usage. The form, designated I-MICH-15 (TEST), had been utilized from April 1 through June 30 of this report period and had proven highly satisfactory with a few minor changes to be incorporated when adopted as a permanent form rather than a test form.

d. Six construction contracts for roads, parking areas, structures, and modification to facilities let during this period were reviewed by the Safety Officer.

3. Frequency Rates

a. The overall frequency rate for this report period for Michoud was .26. This includes the federal employees at Michoud Operations, the direct contract employees of the S-I/S-IB contractor, the S-IC contractor, and the support services contractor personnel and all sub-contractors. This frequency rate is considered to be outstanding in relation to similar types of exposures in both government and industry. It compares very favorably with the frequency rate established for the second six-month period of 1964 of 1.19 and of the first six-months of 1964 of 0.92. It also compares exceedingly favorably with the 1.23 frequency rate for the entire year 1964.

b. Application was made to the National Safety Council for an award for the federal employees of Michoud who had worked 1-¼ million man-hours without a lost-time injury. Notice was received that the award has been

granted and that a plaque signifying the award would be forwarded. An award ceremony was scheduled for early in the next report period.

4. Civil Defense

Civil Defense activities showed definite progress during this report period, as follows:

a. All shelter areas were marked and stocked.

b. Shelter manager instructors were trained by DOD and were in the process of extending this training to other employees.

c. An emergency generator was approved for installation at the Slidell Computer facility and three emergency generators for installation at the Michoud plant.

d. Action was taken toward obtaining and equipping a command post trailer to be utilized as temporary command post housing in the plant factory shelter, pending the construction of a support services contractor building. This building will include fall-out protection in certain areas, and will include a command post section.

e. Committees were formulating detailed plans of operation in consonance with the Civil Defense Charter during the reporting period.

C. Security

1. Preliminary plans were completed for the Naval Research Laboratory's 35th Symposium on Shock, Vibration, and Associated Environments which NASA will host and will be held in New Orleans, Louisiana, during October 1965. The Michoud Operations Support Services Contractor was designated to provide the necessary assistance to support this symposium. Arrangements for conducting the classified portion of this symposium were completed by the Michoud Operations Security Office.

2. Review by the Acting Security Officer of all Michoud Operations instructions pertaining to security functions was in process during this period. It is planned to revise or rewrite all instructions, as appropriate.

3. The Michoud Operations Acting Security Officer was appointed a technical evaluation monitor to monitor the performance of the security function of the Support Services Contractor under the CPAF contract.

4. The Michoud Operations Acting Security Officer reviewed all aspects of the workload of Michoud Operations Security Office. As a result of this survey, reports were reduced in number, and several were eliminated. Also, the number of visitor and temporary type badges at Michoud Operations was substantially reduced.

D. Support Services

1. The Michoud Harbor handled twelve barge shipments of components between Michoud and Huntsville, seven stage shipments by barge, and one shipment on the Navy LSD Point Barrow.

2. All passenger vehicles furnished under Mason-Rust Contract, were replaced with new 1965 vehicles in March. Contractor-furnished pickup trucks were replaced with new Government-owned vehicles in April and May 1965.

E. Administrative Services

1. General

Federal Housing Act - Section 809 Program. Applications for Certificates of Eligibility under Section 809 of the Federal Housing Act continued to be received in considerable volume. During this period 221 applications were received and 214 certificates were issued.

2. Management Analysis

Michoud Management Instructions M-1-1, Subject: "Michoud Operations Directives" was published during the reporting period. This instruction implemented the Industrial Operations Management Instruction on issuance of management instructions and program directives, as applicable within Michoud.

3. Personnel

a. Total personnel on board at Michoud Operations as of June 28, 1965, was as follows:

| | |
|---|---|
| NASA | 277 |
| Boeing | 7,110 |
| Chrysler | 3,303 |
| Mason-Rust | 938 |
| Telecomputing Services, Inc. | 218 |
| Rocketdyne | 16 |
| Total | 11,862 |

b. The number of personnel on board in each organizational element as of June 30, 1965, was as follows:

| | |
|---|---|
| Office of the General Manager | 5 |
| Programs Office | 6 |
| Contracts Office | 26 |
| Facilities Office | 9 |
| S-I/IB Stage Operations Office | 9 |
| S-IC Stage Operations Office | 10 |
| Engine Office | 3 |
| Support Operations Office | 27 |
| Computer Operations Office | 8 |
| Financial Office | 11 |

| | |
|---|---|
| Documentation Office | 7 |
| Public Affairs Office | 3 |
| Counsel Office | 2 |
| Assistant for Quality Assurance and Reliability | 3 |
| Quality Engineering Office | 46 |
| Reliability Office | 6 |
| Product Control Engineering Office | 98 |
| Total | 279 |

c. During the period January - June 1965 the PREP (Position Review and Evaluation Plan) system, which evolved from the Tabaka Survey, was implemented at Michoud. A directive was published (I-MICH 17-2) establishing the Michoud Operations Review Committee to evaluate positions, and review and make recommendations on intraorganizational alignment, and unresolved differences. At the end of June, approximately 60% of all Michoud positions had been written, evaluated, reviewed and processed to MSFC, and the remaining 40% were in various stages of completion.

d. A major problem area continued during this reporting period in personnel service support from MSFC. Substantial backlogs of personnel action requests in MSFC were not resolved due to the priority given to the PREP survey and the "freeze" situation on promotions, appointments and quality increases imposed by Bureau of the Budget average grade and salary limitations. The impact on operations and morale of the workforce began to reach serious proportions, and the difficulty in recruiting and filling vacancies was compounded by this situation.

e. On May 19, 1965, an election was held at Michoud Operations in conjunction with and as part of the center-wide MSFC election to determine

the issue of exclusive recognition of the American Federation of Government Employees, Lodge 1858. The right to exclusive recognition under the provisions of Executive Order 10988 was won by AFGE Lodge 1858.

## CHAPTER V

## FACILITIES MANAGEMENT

### A. Construction of Facilities Summary

1. The following Construction of Facilities funds were provided Boeing and Chrysler during this reporting period:

| Contractor | Purpose | Project | Funding |
|---|---|---|---|
| Chrysler | Additions to Production Facilities | 6309 | $151,384 (FY 64) |
| Boeing | Hydrostatic Test and Cleaning Facility | 6304 | 4,828 (FY 62) |
| Boeing | Hydrostatic Test and Cleaning Facility | 6304 | 119,000 (FY 63) |
| Boeing | Modification for Activation of the S-IC Area | 6306 | 150,030 (FY 63) Decrease |
| Boeing | Additions to Production Facilities | 6309 | 175,000 (FY 64) |
| Boeing | Alterations to Saturn First Stage Production Facility | 6313 | 120,000 (FY 65) |

2. During this reporting period, there were no funding actions, neither Construction of Facilities nor Research and Development, affecting Construction of Facilities Projects related to Mason-Rust Contracts.

3. The following NASA (MSFC) Contractors, whose activities are managed by MSFC, were provided Construction of Facilities funds as indicated:

| Contractor | Contract | Purpose | Project | Funding |
|---|---|---|---|---|
| deLaureal & Moses, Inc. | NAS8-12037 | Additions to Production Facilities | 6309 | $19,931 (FY 64) |
| Mid-Wesco Enterprises Inc. | NAS8-12090 | Additions to Production Facilities | 6309 | 73,553 (FY 64) |
| R.B.Tyler Co., Inc. | NAS8-15010 | Parking & Security Improvements | 6310 | 45,162 (FY 64) |
| R.B.Tyler Co., Inc. | NAS8-15010 | Road and Airstrip Rehabilitation | 6311 | 246 (FY 64) |

| | | | | |
|---|---|---|---|---|
| R.B.Tyler Co., Inc. | NAS8-15010 | Vehicle Component and Supply | 6312 | $23,725 (FY 64) |
| The Keller Construction Co. | NAS8-15014 | Facility Additions, Extensions and Alterations to Support S-IB and S-IC Production | 6315 | 1,351 (FY 65 |
| Granite Construction Co. | NAS8-15004 | Vehicle Component Supply Bldg. | 6312 | 32,512 (FY 64) |
| Quinn Construction Co. | NAS8-15008 | Additions to Production Facilities | 6309 | 18,673 (FY 64) |
| S.I.P. Inc. | NAS8-15013 | Additions to Production Facilities | 6309 | 8,232 (FY 64) |
| Fruin-Colnon Co. | NAS8-15036 | Engineering Building - Michoud Plant | 6308 | 292 (FY 63) |

B. Maintenance and Operations

1. Chemical Waste Disposal

In late November 1964 a major failure occurred in the Chemical Waste Deep Well System. The retaining screen located at the 6500 ft. depth completely collapsed from corrosion. This necessitated a complete reworking of the outcasing and injection tube including the installation of a modified screen design. The cost for reworking the system was approximately $250,000. In February 1965 the deep well was placed in operation and had injected over 50 million gallons of chemical waste at close of the reporting period. The total maintenance and operational cost from February 1964 through June 30, 1965, was $.0034 per gallon of waste handled.

2. Utility Outages

As a result of major construction activity, it was necessary to schedule utility outages to permit construction contractors to complete the necessary utility system tie-ins. All outages were fully coordinated by the Facilities Office with the three Prime Contractors. A total of 144 outages were scheduled during this six month period, representing a 3.3%

downtime period, which is exceptional for the quantity of construction activity involved. The Facilities Office took full advantage of shutdown by simultaneously scheduling plant maintenance work which could be deferred for these shutdown periods.

3. Utilities Usage

Overall cost of utilities such as purchased electrical energy, potable water and natural gas during this six month period increased approximately 10% over the previous six month period, or from $600,000 to $660,000. This increase is attributed solely to increased production and general plant requirements.

4. Cost Savings

During this period the Facilities Office initiated and placed into effect two cost savings campaigns under the overall NASA Cost Reduction Program.

The first was a "Lights Out" Campaign. This will result in an estimated savings of $5,000 per month.

The second was a "Keep Doors Closed" Campaign. The 43-acre Manufacturing Building (No. 103) has 85 doors and is environmentally controlled. The cost savings resulting from this campaign are intangible, but are directly associated with production activity, and the results will be realized in improved quality and in manufacturing and process controls.

C. Construction

1. During the period January 1, 1965, through June 30, 1965, the following major items of construction were completed by the Government:

a. Modifications to Slidell Computer Office and air conditioning system which included a mechanical room to house additional air handling, an additional chiller, and extended ductwork, to provide more air conditioning for the additional computer load.

b. South Mezzanine Cafeteria in the manufacturing plant to provide cafeteria service to plant workers and other personnel in the immediate area. The new cafeteria seats approximately eight hundred people and provides two hot food serving lines and two sandwich lines. The cafeteria is self-contained and preparation of food is accomplished in the attached kitchen.

c. Additions to the existing dock embarkment by bringing in additional fill and clam shell ballast to stop erosion due to tidal action which was becoming severe. The situation was corrected.

d. Landscaping and the addition of entrance drive for visitor parking for the Engineering and Office Building.

2. During the period January 1, 1965, through June 30, 1965, the following major items of construction were completed by the Boeing Company:

a. Tank Repair Position in the Vertical Assembly Building to repair LOX and/or Fuel tanks which need rework due to minor deficiencies noted in hydrostatic or other tests.

b. Silk Screen and Potting Facility, to makeup electrical cable, fittings and printed circuits for use in flight hardware.

c. LOX Impact Test Facility, to checkout LOX compatability of the various materials used in flight hardware.

d. Visual Instrumentation and Recoverable Camera Facility, for check and testing of components for in-flight television monitoring and recoverable photograph equipment.

e. Major Painting and Shipping Preparation Facility, for painting of major components and preparation of these items for shipping.

f. Horizontal Installation Facility, to install all engines of the S-IC and the pneumatic electrical-electronic and propulsion systems.

g. Stage Test Facility, composed of four test cells and a three-story control building, to perform various tests on the pneumatic, hydraulic, mechanical, telemetry and electrical systems of the booster.

3. During the period January 1, 1965, through June 30, 1965, the following major items of construction were completed by the Chrysler Corporation:

a. High Pressure Test - Phase II, which consisted of construction of equipment pads, electrical equipment shelter, water and electrical mains and distribution systems and pile supported test pads. Also, a cooling system and a high pressure gaseous system for the testing of components were installed.

b. Test Cell Sprinkler System, $CO_2$ System and Alarm System, for fire control purposes in hazardous test work.

c. Vertical Tank Test Crane for hoisting capability over the vertical tank test frame area, for in-plant qualification and reliability tests for S-IB.

d. Potting area enclosure, to provide environmental control for potting connectors in electrical cables and harnesses.

# CHAPTER VI

# CONTRACT AND FINANCIAL MANAGEMENT

## A. Contract Management

Contractual actions during the reporting period are reported in this history under the programs to which they pertain. Contracts relating to support activities and computer operations are reported under those headings. The NASA construction and architect-engineer contracts awarded by MSFC and forwarded to the Michoud Contracts Office for administering during the period January 1, 1965, through June 30, 1965, totaled $4,522,215. This amount included seven construction contracts and four architect-engineer contracts.

## B. Program/Budget Submissions

The Program Operating Plan (POP 65-1) was submitted to MSFC on January 15, 1965. This submission provided detailed plans for the remainder of FY 65, time-phasing of the current guideline program for FY 66, the preliminary FY 67 budget submission, and runout requirements through Project completion for R&D Projects. Also, during April 1965 POP 65-2 was submitted to MSFC in three parts: R&A and Minor Construction Requirement, AO PEP data and yearly obligation rate, and R&D Analysis Schedule.

## C. Financial Management

### 1. Funding Activity

Fund certifications in the amount of $69,791,696, and vouchers for $179,367,463 were processed during the period.

### 2. Surveillance of Construction Contracts

Approximately 1,300 payrolls for an average of 25 construction contracts were examined for compliance with the Davis-Bacon Act, Copeland Act, and the Fair Labor Standards Act of 1962.

3. Price Analysis of Contractors' Proposals

Evaluations were made of 101 contractors' proposals for contract increases totaling $77,137,692 and they were recommended for acceptance and/or negotiated for $55,713,252. One contract decrease proposal for $23,678,087 was recommended for acceptance in the amount of $27,875,105.

4. Review of Subcontracts and Purchase Orders

A cost analysis of proposed subcontracts and purchase orders was begun during the period. Twenty-four actions for $2,100,583 were processed.

5. Contract Cost Accruals

Contract cost accruals in the amount of $186,096,000 were recorded during the half-year ending June 30, 1965.

6. Contractors' Salary and Wage Schedules

Reviews were made of 175 contractors' salary and wage personnel actions during the period.

7. Cost Reduction and Control Program

Cost reductions of $16,379,978 were reported during the six months ending June 30, 1965. The largest savings constituted conservation of $15,000,000 of funds to date by acquisition of government surplus equipment in lieu of commercial procurement.

8. Cost Suspensions/Disapprovals

The function of processing contract cost suspensions/disapprovals and representing the Contracting Officer in settling differences with contractors was assumed by the Financial Office during the period.

9. Monitorship of Support Services Contract

A Financial Office representative was designated to monitor the financial aspects of the Mason-Rust cost-plus-award fee contract.

10. Surveys and Analyses

Analyses of the cost of computer operations, team participation in S-IB and S-IC cost model studies, and a team survey of The Boeing Company were performed during the half year.

## CHAPTER VII

## COMPUTER OPERATIONS

### A. General

1. In January, a new report entitled Facilities Information Report was published. The purpose of this report was to provide from a central source planning information on projected equipment and other changes which would affect facility requirements.

2. A meeting was held on April 6, 1965, with representatives of the Contracts and Support Services Offices concerning requisitioning, purchasing, and storing of supplies. Procedures were reviewed and methods established for improving supply reaction time and to insure that only appropriate items are requisitioned by authorized organizations.

3. A Master Plan for the Computer Operations Office was prepared, published and distributed in May 1965. This plan includes a listing of present equipment and facilities, scheduled changes, and a master plan for development and expansion of capability in an orderly fashion.

4. A meeting of the Slidell Computer Board was held at Slidell on May 12, 1965. Agenda items included status reports on each of the areas of computation, presentation of the computer utilization forecast analysis, considerations on the centralization of EAM equipment, "third generation" computer characteristics and plans to procure such equipment, and the effect of data reduction and flight evaluation requirements on scientific computing capability.

5. As a result of workload projections and future requirements, a study was conducted to determine the feasibility and practicality of a switching system to provide flexible interconnection of the analog computers' trunklines. It was determined that this system was feasible,

practical, and needed by all user groups. This switching system will be capable of interconnecting certain portions of all analog computer elements, and provide an interconnection for auxiliary equipment input to all computers. Plans and specifications are being prepared for the acquisition of a switching system.

6. A meeting of the COBOL (Common Business Oriented Language) Special Interest Group was held at the Computer Operations Office on June 10 and 11. The group, a committee of the Honeywell Users Group (HUG) met for the purpose of finalizing papers and plans concerning use of COBOL which are to be presented at the fall HUG meeting in New Orleans. Valuable technical data and knowledge is shared within the HUG organization.

B. Contracts and Funding

1. On January 8, 1965, a one-year option extension of Cost-Plus-Fixed Fee Contract NAS8-5614 was exercised by NASA with TSI by Modification No. 16. Under the provisions of this modification, TSI assumed supply handling and accountability functions at the Computer Operations Office, in addition to operation and maintenance of additional computer equipment. The twelve month's extension increased the contract value by $2,172,517 (includes a fee of $125,025) to a new total of $4,328,095. Funding during this report period amounted to $997,041, for a total FY 65 funded amount of $1,709,439.

2. In support of the Michoud Operations Computer activities at Slidell, Louisiana, during the report period, $39,585 was funded for Desk Analog Computer and obligational adjustments to items reported in the previous report are as follows:

| | |
|---|---|
| Analog Tape Recorder | ($10,077) |
| High Speed Microfilm Recorder | ($105,189) |
| Eraser, Magnetic Tape | ($532) |

Digital equipment rental obligations during this same period amounted to $584,078 and for FY 1965 $4,189,722.

3. The contract for a SC-4020 microfilm plotter was awarded on January 27, 1965, and the equipment scheduled for installation by June 25, but subsequently rescheduled to July.

4. A MSFC contract modification was received which provided that the government (Computer Operations Office) would provide computation services required by the contract with Tulane University. The work is in the nature of a research grant by MSFC to Tulane and requires computation support of various types not available at the University. This is the second instance in which the Computer Operations Office has provided support to Tulane University.

5. A contract has been awarded to Sangamo for a 14-channel FM analog magnetic tape recorder/reproducer. This unit is to be used as an input/output device for the analog computers and as a loop instrument for generating time delays.

6. A desk model analog computer procurement contract was awarded to Systron-Donner. This computer will be used for processing small problems and investigating protions of larger problems, thus relieving the larger systems of this load during peak requirements.

7. A contract was awarded to the Raytheon Company for a Hybrid computer. This system was scheduled for delivery in October 1965.

C. Equipment and Operations

1. The Dynatronics Analog and Digital Quick Look System was received and installation started at Michoud, Building 350, on January 11. Acceptance tests were completed in early February, and use of the equipment for normal operation was started.

2. On January 27, 1965, the first of two magnetic tape erasers (degaussers) was received. This equipment is used to insure removal of proprietary data from tapes prior to reuse and to permit reuse of data reduction tapes.

3. Conversion of IBM 7094 tape drives from Model IV to Model VI was completed during January. This modification provided for higher tape density (800 bits per inch), yielding a faster input-output capability.

4. Operations of the GMAC Honeywell 800 in Atlanta, Georgia, was suspended January 20, 1965. Computation in the Management and Engineering Area was maintained on a current basis without the use of this off-site support.

5. On January 22, 1965, the first H-1800 was installed and the H-800-25 went off rental, but remained in place to provide allowed program checkout time. Observation of the workload level during the conversion period, coupled with the forecasted future load, led to a decision to retain the H-800-25. It went back on rental May 1, 1965. The second H-1800 system was installed and became operational on April 1, 1965. This system replaced the H-800-26 which went off rent March 18, and was returned to the manufacturer the following day.

6. Procurement action was initiated for usage meters for all central processing units of the H-1800, H-800, and H-200 systems to provide a more accurate record of utilization than can be provided by manual recording.

7. Conversion of all computer applications from the Honeywell 400 to the Honeywell 800 was completed in January, and the Honeywell 400 was returned to the manufacturer.

8. A new key punch machine and an additional decollator were received and installed in January and May, respectively. An additional burster was also received in April.

9. The Automatic Telemetry System supplied by Data Control Systems was received and installation started in February. Acceptance tests were completed in early May, and the equipment is now being used to assembly and test routines in preparation for production operation.

10. In March, an IBM 7040 and other hardware was connected to what was formerly the three channel IBM 7094 II to form a 7094/7040 Direct Coupled System. This system presently includes eight 729-VI tape drives, two 1403-3 printers, a 1402-2 card reader/punch, a 1301-2 disc file, and 1014 remote inquiry station. The system is also connected with an IBM 1440 computer at Michoud with one 1403-3 printer and a 1402-2, 7335 tape unit, card reader/punch. These changes significantly improved scientific computation capability and reduced work turnaround time at a direct cost savings of approximately $3,000 per month.

11. Brookley Air Force Base calibration van arrived March 18, 1965, for the regular semi-annual calibration of analog test equipment.

12. Beginning March 22, all jobs submitted for operation under IBSYS were set up for DCS operation. This enabled operations personnel to balance the workload between the DCS and the stand-alone 7094 II computer. The only jobs which cannot be processed on the DCS are APT, PERT, SPOOK, and certain others with unique I/O requirements.

13. The GE-225 system was relocated to Building 350 the weekend of March 27. This system will be primarily used for support of Boeing's system checkout activities, but will also provide normal peripheral support for other computation needs.

14. A fluid-type tape cleaner, manufactured by General Kinetics, Inc., was ordered by Mason-Rust on March 10 and received on May 11. This cleaner is used to clean the 3/4" magnetic tapes associated with the Management

and Engineering computer operations and has decreased the amount of lost machine time due to dirty tapes.

15. Specifications for next generation computers were forwarded to MSFC R-COMP on April 23, 1965, for procurement action. The specifications were developed consistent with plans to replace existing digital computing equipment with less costly recently developed computers in both the Scientific and Management and Engineering Areas.

16. A plan was developed and implemented in April to move most reproduction equipment to the Michoud plant. Minimum equipment was retained at Slidell to meet minimum needs, but with all computer-originated documents reproduction requirements are accomplished at the Michoud plant.

17. Vibration and acoustic analysis equipment was received in June as a part of the data reduction complex.

D. Facilities

1. On February 27, 1965, it was announced that the Quinn Construction Company, Inc., of New Orleans, had been awarded the contract for the Slidell Computer Operations Office building expansion. The contract price was $1,260,000, and the construction time was estimated to be one year. The construction contractor began excavation activities for the new computer wing in March. Several disruptions in the electrical grounding system caused failures in the IBM computing systems located in the Scientific computing area. Excessive vibrations from demolition work also caused some errors in Honeywell equipment. Every effort was made to prevent the construction phase from disrupting present computer operations, and no serious effect upon the Saturn program resulted.

2. Approval was received to begin the design of the new cafeteria at Slidell in early March. The construction contract was awarded to Quinn Construction Company by MSFC in June with construction expected to require approximately seven months. Contract price was $163,000.

3. During March, the parking lot was re-striped. This was done to increase the number of parking spaces from 238 to 260.

VII

# MICHOUD ASSEMBLY FACILITY - HISTORICAL REPORT

July 1, 1965 - December 31, 1965

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Foreword

LIST OF ILLUSTRATIONS

## FOREWORD

This report covers the period July 1 - December 31, 1965; however, in consonance with the new requirement for annual rather than semi-annual reporting, the following brief summary of major activities for the year 1965 is furnished.

### Michoud Assembly Facility - 1965

The first giant step in the "Michoud to the Moon" journey was taken during 1965 with the successful flights of the first two Saturn boosters produced at the Michoud Assembly Facility. The two Chrysler Corporation-built Saturn I first stages, combined with their second stages, orbited Pegasus meteoroid technology satellites to determine the number and size of meteoroids in near earth orbit. The two historic flights marked the end of NASA's pioneering Saturn I program. All ten vehicles were flown successfully.

Two equally significant milestones achieved at Michoud during the year were assembly of the first Saturn IB and Saturn V flight boosters. The first Saturn IB booster (S-IB-1) was shipped to Kennedy Space Center in August for scheduled launching early in 1966. At the close of the year, Chrysler was assembling or testing five additional S-IB stages. Launch of the first Boeing-assembled Saturn V flight booster (S-IC-3) was planned for late 1967. Assembly of major components for both S-IC-4 and S-IC-5 were nearing completion at Michoud as the year ended, with assembly of the complete S-IC-4 stage scheduled to begin in January, 1966.

At the end of 1965, contracts with firms operating at Michoud were

valued at more than $1.2 billion. Included in that figure were approximately $56 million in construction contracts. Total Government and contractor personnel employed at Michoud represented an annual payroll of about $80 million.

# CHAPTER I

## MICHOUD HIGHLIGHTS

NASA announced on July 1, 1965, the renaming of "Michoud Operations" to "Michoud Assembly Facility." NASA Administrator James E. Webb explained that the change was made to better reflect the mission of the organization.

The second half of 1965 saw continuing progress in both the S-IB and the S-IC programs. Highlights of operational activities included:

1 Aug 65 - The second Saturn IB booster, S-IB-2 was shipped from MSFC to MAF for poststatic firing checkout. The booster was fired for a 30-second run on July 8 and a 2½-minute full-duration test on July 21.

21 Sep 65 - Announcement was made of modification of the contract with Chrysler Corporation Space Division to provide ground support equipment for the Saturn IB program. The $4,152,717 contract modification covered the manufacture, test and checkout of ground support equipment for the Saturn IB booster.

22 Sep 65 - Modification of the Boeing contract to provide services in the Saturn V ground support equipment area was announced. The $4,514,295 contract change provided for services in connection with systems engineering and integration of Saturn V mechanical ground support equipment. Tasks called for included analysis of ground support equipment, monitoring equipment qualification testing, acceptance testing, conducting design verification, and interface and installation control documentation.

28 Oct 65 - The first two H-1 rocket engines uprated to 205,000 pounds thrust were delivered to CCSD this week from Rocketdyne's Neosho, Missouri, plant. The uprated engines add a total of about 40,000 pounds thrust to NASA's Saturn IB booster, increasing the total thrust of the eight engine cluster to 1,640,000 pounds.

9 Nov 65 - The third Saturn IB booster, designated S-IB-3, was returned to Michoud after successfully completing static firing tests at MSFC.

7 Dec 65 - The fourth Chrysler-assembled Saturn IB first stage departed Michoud aboard the NASA barge Palaemon for static firing tests at MSFC.

8 Dec 65 - A full-scale Saturn V booster weight simulator, used in testing Saturn V rocket handling equipment and facilities, was shipped to Kennedy Space Center on the barge Poseidon.

8 Dec 65 - The first Saturn V flight booster built at MAF by the Boeing Company was moved from the Vertical Assembly Building to the Manufacturing Building for installation of engines and associated components.

Highlights of support activities included:

15 Oct 65 - Awarding of two construction contracts for repair of buildings at MAF which were damaged by Hurricane Betsy. The Tri-State Roofing Company of Knowville, Tennessee, was awarded a $534,817 contract for repair of roofing damage. J. A. Jones Construction Company, Charlotte, North Carolina, was awarded a $1,130,531

contract to make all other necessary repairs, including structural, electrical, and glass damage. Both contractors had begun emergency repairs September 13, three days following Betsy's destructive sweep through the New Orleans area.

14 Dec 65 - Announcement was made that NASA had exercised a one-year renewal option with the firm of Mason-Rust for continued provision of support services at MAF. The new $13,121,252 extension of Mason-Rust's basic cost-plus-award-fee contract was awarded by MSFC to become effective January 1, 1966, continuing in force through December 31, 1966.

21 Dec 65 - The Range Systems Division of Ling-Temco-Vought, Inc., Dallas, Texas, was selected for final negotiations to provide computer support services for MAF. Cost for the first year was estimated to exceed $1.5 million. Services to be provided included operation and maintenance of some 20 digital and analog computers, a data transmission system, a data reduction system, and related electronic equipment.

A non-operational "highlight" was the visit to Michoud of Hurricane Betsy on the night of September 9, 1965. Although preliminary measures taken to secure the facility, together with actions taken during and following the storm, served to minimize damage to the extent possible, severe roof and building damage was experienced. The impact of the hurricane and details of her visit are reported in appropriate chapters of this history.

## CHAPTER II

## GENERAL

### A. Organization and Functions

There were no organizational changes during the period; however, in consonance with the redesignation of the activity as "Michoud Assembly Facility," request was made on August 5, 1965, to change office names to more accurately reflect the functions performed, as follows:

| FROM (Current Official Title) | TO (Proposed Official Title) |
|---|---|
| S-I/IB Stage Operations Office | S-I/IB Office |
| S-IC Stage Operations Office | S-IC Office |
| Computer Operations Office | Computation Office |
| Support Operations Office | Support and Management Services Office |

Proposed reorganization of the Contracts Office, reported in previous history (Jan 1 - Jun 30, 1965) had not been formally approved at the close of this reporting period.

### B. Key Personnel

There were no changes in key personnel during this reporting period.

### C. Public Affairs Activities

30,897 persons visited Michoud during the last half of 1965, and 279 tours of the plant were conducted.

### D. Contractor Quarterly Reviews

1. Two Quarterly Reviews were held during the period between Chrysler Corporation Space Division and Michoud/MSFC management. The September review was held in New Orleans and the December review in Huntsville.

2. Two Quarterly Reviews were held in New Orleans during the latter half of 1965 between the Boeing Company and Michoud/MSFC management.

## CHAPTER III

## PROJECT MANAGEMENT

### A. Saturn I/IB, S-I/B Program

#### 1. Stage Operations

##### a. General

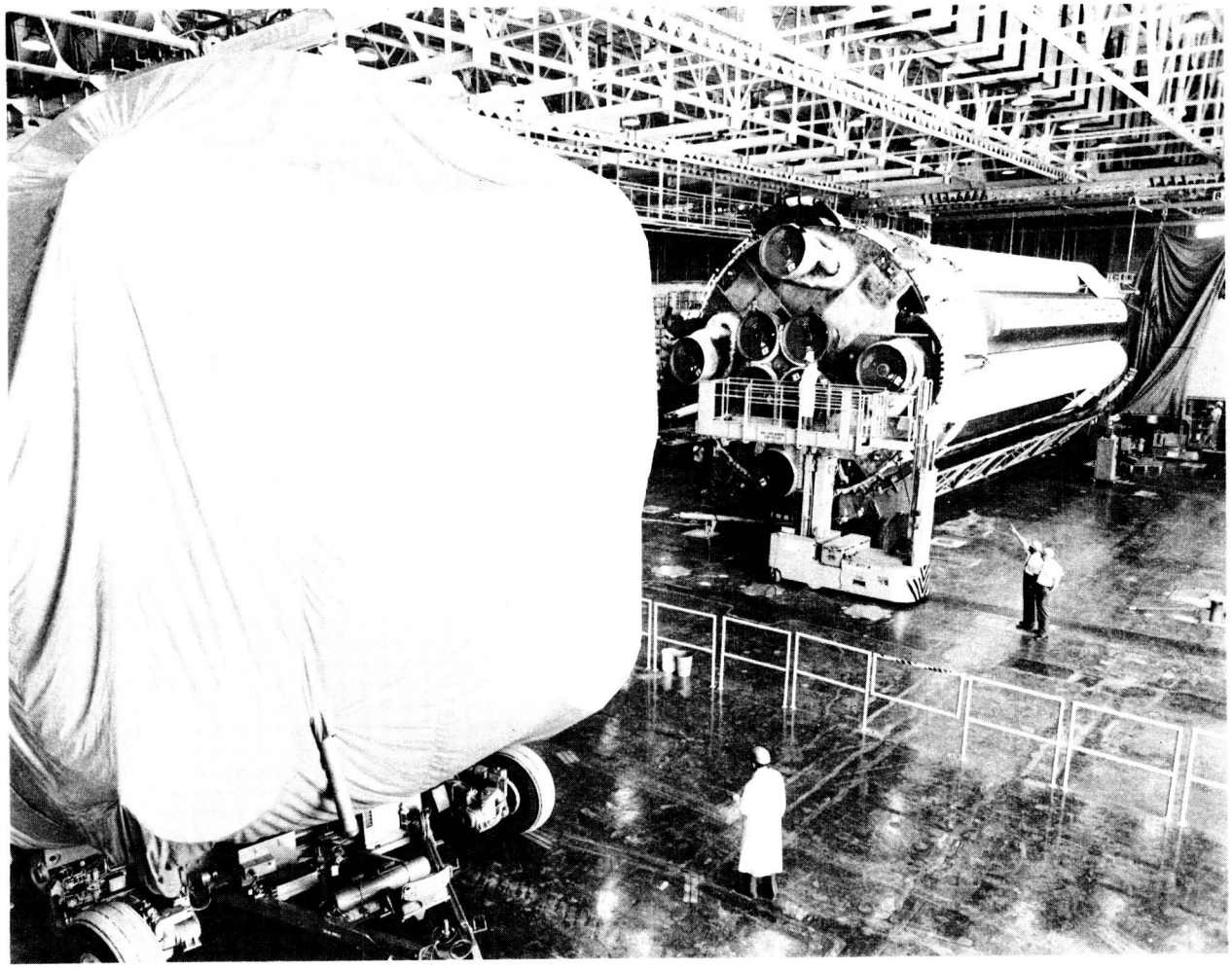
(1) Negotiations: The procedure initiated by the S-I/IB Operations Office to negotiate Documentation Directives on a monthly basis was placed in effect and afforded a closer scrutiny of costs than was previously possible. The S-I/IB Operations Office participated in these negotiations on a technical basis. All engineering change proposals authorized by Documentation Directives (DD's) were negotiated with CCSD through October 1965, completing DD negotiations to the target date of November 1, 1965, for contract incentivizing purposes.

(2) Damages: Subsequent to the last historical report, CCSD encountered fewer damages to equipment than previously experienced. Carefulness and safety were stressed by CCSD management.

(3) Spider Beam: On July 13, 1965, the S-IB spider beam testing was completed. The Qualification phase of the testing was completed on July 7, 1965, and the Reliability phase of the testing was completed on July 13, 1965.

(4) Suction Line Qualification Testing

After numerous failures of the LOX and fuel suction lines to meet the requirements imposed by IN-P&VE-S-63-1, revised and modified, steps were taken to resolve the problems encountered in the qualification testing. The vibration test procedure was revised to levels more consistent with flight operation.



THE FIRST TWO SATURN IB FLIGHT BOOSTERS

Covered in the foreground is the tail section of S-IB-2, returned to Michoud following static tests at Huntsville. In the background is the S-IB-1, being prepared for shipment to the launch site at Kennedy Space Center.

b. Key Operational Milestones

(1) SA-10: SA-10 was successfully launched on July 30, 1965 at 7 a.m. All systems operated satisfactorily. Pegasus III was injected into an orbit of 333 miles apogee and 325 miles perigee. It will orbit the earth every 95 minutes, measuring meteroid concentrations.

(2) S-IB-1: On August 9, 1965, S-IB-1 was shipped to Cape Kennedy for pre-flight checkout. It arrived at the Cape on August 14, 1965.

(3) S-IB-2: The first static firing of S-IB-2 was cut after approximately 3 seconds. Preliminary investigation indicated that a thrust O.K. Pressure Switch, in number four position, was slow in pickup. A second static test was made on July 9, 1965. The S-IB-2 booster was successfully static fired with a long duration (144 seconds) test run on July 20, 1965. Fuel tank #3 wrinkled during the static firing. CCSD took corrective action to preclude damage to containers in the future. An inboard engine on S-IB-2 was contaminated by gear case oil which leaked back through the "T" valve and check valve in the LOX pump cavity. It was replaced by the spare engine. At the end of the reporting period, S-IB-2 was undergoing preparation for shipment to Cape Kennedy.

(4) S-IB-3: LOX tank #2 on the S-IB-3 stage was damaged during LOX loading at the MSFC static test stand. After testing, no cracks or leaks were found and the tank was used. S-IB-3 was static fired (short duration) on October 12, 1965. The test ran for 25.17 seconds. All systems functioned satisfactorily. S-IB-3 underwent long duration static firing on October 26, 1965 (145 seconds) and all systems functioned satisfactorily. This stage was shipped to the Michoud Assembly Facility on November 7, 1965, and was undergoing post-static modification and repair at the close of the reporting period.

(5) S-IB-4: This stage was shipped to MSFC-Huntsville on December 7, 1965, for static testing.

(6) S-IB-5: Clustering of S-IB-5 began during the week of July 19, 1965. Pre-static functional checkout began on November 30, 1965.

(7) S-IB-6: Clustering operations of S-IB-6 began on October 25, 1965.

(8) S-IB-7 and S-IB-8: Structural sub-assembly operations began during this report period.

2. Quality Assurance and Reliability

a. Quality Engineering

(1) Review and evaluation were conducted on adequacy of and compliance with the S-IB stage contractor's quality assurance procedures and requirements of the stage contract. Discrepancies found were brought to the attention of the contractor for corrective action. Extensive review and follow-up were made to insure resolution of quality problems caused by Hurricane Betsy. Major quality surveys were conducted in the following contractor areas:

(a) Inspection, test, and measuring equipment.

(b) Control of contractor procured material.

(c) Control of contractor fabricated articles.

(d) Audit of quality program performance.

(2) Direction and assistance were provided to the contractor and his subcontractors and vendors in establishing and maintaining an effective, efficient, and timely procurement and source control program. Coordinated with MSFC Quality Assurance Representatives and other Government agencies, requests for source inspection and quality requirements assigned on procurement documents. Coordinated and resolved quality problems at vendor activities. Field trips to vendor activities were curtailed because of lack of travel funds.

(3) The contractor's quality data systems were reviewed and quality and reliability data were consolidated and evaluated to maintain constant cognizance of the quality level maintained by the contractor, and to detect and resolve problem areas. Significant activities during the period were:

(a) The contractor implemented a mechanized system for maintaining failure and discrepancy data.

(b) A regular weekly presentation of contractor quality status was established for NASA management.

(c) A regular weekly report of outstanding quality problems and accomplishments was established for the MSFC Stage Manager and Quality and Reliability Laboratory.

(d) Quality Engineering follow-up on quality trends and problems was intensified and broadened through use of new files and procedures.

(4) In the design evaluation area, engineering planning and direction were provided to insure that the contractor's quality program provides for determination and inclusion of Quality Engineering requirements in drawings, specifications, and technical documents, for fulfillment of these requirements in functional, qualification, and reliability testing, and for improvement of design and quality through analysis of failures. The contractor's failure analysis system was given close attention during the period, with emphasis on Unsatisfactory Condition Reports generated at static firing and launch site.

(5) In the product evaluation area, engineering planning, assistance, and direction were provided to the contractor to assure that Quality Engineering requirements were fulfilled during fabrication, processing, assembly, packaging, and shipment of Saturn boosters. The contractor's operating documentation and techniques were reviewed and evaluated, and direction was given concerning

development of new techniques and correction of existing deficiencies.

b. Product Control Engineering

(1) Vehicle S-IB-1 received post-static functional checkout during the period June 10 to July 20, 1965. The major problem encountered during this checkout phase was that the turbopump lox shaft seals leaked beyond specified limits on engines H-7047 position #2 and H-7046 position #1. After seal replacement by Rocketdyne personnel, the engine lox turbopump seals were well within tolerance.

(2) Vehicle S-IB-3 underwent pre-static functional checkout during the period June 6 to August 8, 1965. Many hardware shortages hampered checkout functions. Engine #2 serial No. H-7058 had excessive lox turbopump shaft seal leakage. After seal replacement by Rocketdyne personnel, the engine check was satisfactory. The vehicle purge basket had evidence of contamination (metal chips found after disconnecting a leaking tube assembly). Laboratory analysis on the complete vehicle purge system was requested. Results showed several small metallic chips. After purging with missile grade air, another sample of the complete purge basket was taken and found to be acceptable.

(3) Vehicle S-IB-4 pre-static functional checkout was accomplished during the period October 6 to November 9, 1965. No significant problems were encountered.

(4) Vehicle S-IB-2 post-static functional checkout was accomplished from October 1 through November 29, 1965. Due to possible contamination through engine #8 gear case check valve, approximately 65 tube assemblies and fittings were removed, cleaned and reinstalled. Functional checkout was accomplished with no other significant problems. Vehicle S-IB-5 was moved into checkout November 30, 1965, and is presently undergoing pre-static functional tests. This has been the most complete vehicle to enter checkout

for pre-static testing. Testing is approximately 55% complete with no significant problems.

(5) S-IB-I was received from post-static checkout on July 20, 1965, and was shipped to Kennedy Space Center on Monday, August 9, 1965. S-IB-2 was received on August 7, 1965, from Marshall Space Flight Center after static fire, and is in the preparation area before shipment to Kennedy Space Center. S-IB-3 was moved from pre-static checkout August 18, 1965, and after modifications was shipped on September 9, 1965, for static fire at Marshall Space Flight Center. S-IB-3 was received back from Marshall Space Flight Center on November 8, 1965, and is now in post modification area. S-IB-4 was shipped to Marshall Space Flight Center for static fire December 7, 1965. The S-IB-5 booster was assembled and moved into pre-static checkout on November 30, 1965. All tanks of S-IB-6 have been clustered.

(6) Chrysler operations in the components and electrical/electronic fabrication areas have progressed smoothly with no major problems. An additional Ditmco 610F, circuit analyzer, has been approved for back-up in the electrical areas. An exercise on electrical distributors conducted over a period of several months has resulted in a marked improvement in the quality of these distributors. The experience gained here will be carried on through the program.

(7) The Telemetry Bench Test for S-IB telemetry assemblies was validated and activated during this period. Chrysler now has full capability in telemetry bench testing which work previously had been done by R-QUAL-AAT.

c. Reliability

(1) The Reliability Program Plan REL-10, Revision B, was received and approved and is being updated for the next issue. Two regularly scheduled Human Factors Program quarterly reviews were conducted with CCSD and R-P&VE-VSL.

Contractural coverage to have permanently located Human Factors personnel at Huntsville and KSC is pending. The last scheduled CCSD training course "Reliability Testing" was completed. No additional reliability training courses will be scheduled until there is a sufficient number of new personnel to be trained. The "Reliability Engineering Seminar for Management" course presented by GE and ARINC personnel was attended by NASA and contractor personnel. The CCSD S-IB-2 Reliability Math Model was completed and shows a prediction of .967 for mission success. The Qualification Status List format was revised and is being published by individual documents for each vehicle. The list is now using Criticality categories as designated by the Apollo Test Requirements documents NPC 500-10. A review of the status of the Diagnostic Test Program was conducted. The expenditures per quarter thus far were found to be only a small percentage of program estimates. Meetings were held to update information for the "Reliability Assurance Evaluation Program" which provides management visibility for all program categories. Meetings were held to discuss CCSD's proposal MD-64 for conversion to an incentive contract and corrections were suggested for the reliability effort. Four showings of the film, "The Essential Component," were arranged in connection with the Manned Flight Awareness Program.

(2) The Qualification Test Program under CCSD Proposal MD-17 is nearly complete. Reliability testing which had been all but dormant due to e emphasis on qualification testing has resumed normal activity. Structural tests on the second stage adapter, the fin, and the 70" fuel tank were completed. Forty-eight items of the 76 items in the S-1B Reliability Test Program have started tests and eighteen of these completed. Reliability Test Program for EDS components has been finalized and testing will soon commence.

3. Contracts

a. NAS8-4016

(1) During July-December 1965, 76 modifications were issued to Chrysler Corporation Space Division Contract NAS8-4016. This contract increased in value during this report period in the amount of $16,397,164. This increased the total contract value (through Mod 277, excluding Mods 232 and 233) from $334,669,057 to $351,066,221 (includes $6,149,166 C of F). Contract Modifications 232, Program Redirection, and 233, covering Partial Termination (termination of six S-I Stages and delivery schedule change), when approved by NASA Headquarters, will result in a decrease in the contract value of $27,859,834. The $16,397,164 increase provided the following:

(a) $216,251 - Modification to GFE Hydraulic Lifting System, develop manual "Ordnance System - SIB Vehicle" and Environmental Evaluation of S-IU8 and 10.

(b) $4,152,717 - Saturn IB Mechanical Ground Support Equipment

(c) $1,541,371 - Thermodynamics and Fluid Mechanics Program for Saturn I/IB Vehicles

(d) $2,099,403 - Saturn IB Flight Evaluation

(e) $ 49,778 - System Analysis of the Saturn IB Vehicle with 205K H-1 Engines

(f) $ ( 83,128)- Redesign Liquid Level Adapter - Documentation Directive #454 (credit)

(g) $ 11,703 - Provide Support Services to Rocketdyne

(h) $ ( 14,721)- Additional GFP for checkout of SI & SIB on-board television equipment (credit)

(i) $ 63,830 - A substituted Secure Command System

(j) $ 41,464 - Dynamic Testing of Potentiometer Type Pressure

(k) $3,683,091 - Documentation Directives

(l) $( 391,353)- Deletion of items from the Reliability Test Program

(m) $ 134,531 - Saturn IB Emergency Detection System (EDS) Breadboard Facility

(n) $ 969,049 - Additional effort in the Static Test Operation/ Structural Qualification Test Program for Saturn Instrument Units 200/500S and 200/500S-II

(o) $ 425,603 - ODOP Tracking System for SIB

(p) $ 31,456 - Generation of SIB Stage Contract End Item Detailed Specification, Part I, Prime Equipment

(q) $ 16,077 - Refurbishing Photo Instrumentation Van

(r) $ 470,316 - Logistic Spares Support through June 30, 1966

(s) $ 575,538 - Modification and preservation of S-IB-D/F Vehicle

(t) $ 392,804 - H-1 Engine Lox Dome Retrofit

(u) $ 127,792 - Saturn IB Vehicle Systems Information Drawings

(v) $ 43,919 - Support of T.V. Camera and Lights Test, S-IVB-D Stage; ATOLL Operator Specifications; Modification of Instrumentation and Telemetry Simulator

(w) $ 33,243 - Qualification of two (2) propellant Cutoff Sensors

(x) $1,429,669 - Saturn IB Systems Integration/2nd Qtr Aeroballistics effort

(y) $ 102,784 - Design Integration Computer Program for the Saturn IB

(z) $ 273,977 - Saturn IB Systems Integration, Specification Analysis

(2) Negotiations continued at the close of the report period to incentivize Contract NAS8-4016. Costs have been negotiated and share lines established. The incentive position was scheduled to be presented to NASA Headquarters on January 11, 1966.

(3) A final rate of 4.0% for General Administrative Expense for Calendar Year 1963 and a provisional rate of 3.75% for G&A for Calendar Year 1964 and subsequent years was negotiated for Contract NAS8-4016 during this report period.

(4) Fiscal Year 1966 funding of Contract NAS8-4016 was as follows:

(a) Incremental R&D funding during this report period against FY 66 requirements was $29,264,000.

(b) Incremental R&D funding was reduced during this report period against FY 65 requirements in the amount of $21,571. This reduction was the result of cancellation of the Centaur effort and reducing applicable funding to actual cost.

(c) C of F funding for Plant Modification was unchanged during this same period.

b. NAS8-5602(F)

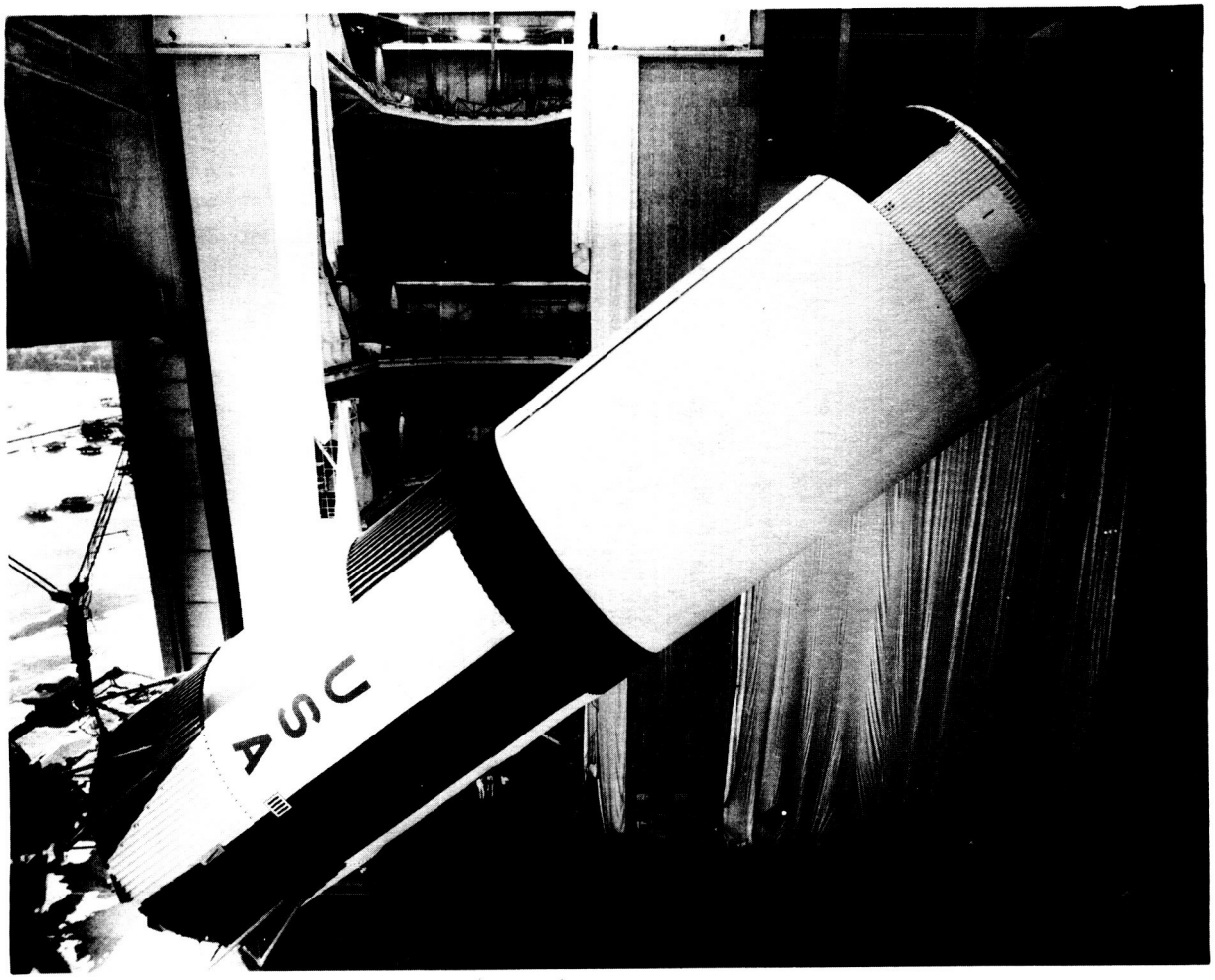
(1) Chrysler Corporation Space Division Contract NAS8-5602(F) for facilities equipment to support the S-I/IB program reflected no change in contract value during the reporting period, and no change in the incremental funding of this contract was accomplished during the report period.

4. PERT

a. Chrysler Corporation Space Division implemented three new networks during this period. Implementation dates were: S-IB-7, August 1965; S-IB-8, November 1965; and S-IB-9, December 1965. The S-IB-1 PERT NETWORK was completed on August 26, 1965 with arrival of the booster at KSC on August 14, 1965 as scheduled.

b. PERT schedule assessment at the close of this report period forecasts Vehicles S-IB-2, S-IB-3, S-IB-4, S-IB-5, S-IB-7, and S-IB-8 to be delivered on schedule. Vehicles S-IB-6 and S-IB-9 range from one to four weeks behind schedule caused primarily by late vendor parts deliveries. Expedited parts deliveries and increased manpower is being utilized by CCSD in order to insure on-schedule vehicle deliveries.

c. CCSD PERT networks as of the end of this report period contain a total of approximately 4000 activities against which bi-weekly schedule is being made.




GROUND TEST VERSION OF THE S-IC STAGE

A ground-test version of the Saturn V first stage (S-IC) is shown as it is removed from its vertical assembly tower at the Michoud Assembly Facility.

B. Saturn V - S-IC Program

1. Stage Operations

a. The S-IC-D stage, the first Michoud-assembled stage of the S-IC Program, was completed and delivered to Huntsville on October 15, 1965. The "D" vehicle, a ground test stage, will be used by MSFC, Huntsville, in the dynamics test program to be conducted on the Saturn V vehicle.

2. The second Michoud-assembled stage (S-1C-F) of the S-IC Program was completed and scheduled for shipment to KSC on January 15, 1966. The stage is to be used as a ground test stage to check out facilities and ground support equipment at KSC. It was expected to arrive aboard the barge Poseidon on January 19, 1966, and to remain on board in storage until required.

3. Vertical assembly of the third Michoud vehicle (S-IC-503) was completed. This stage was on schedule at the close of the reporting period.

2. Quality Assurance and Reliability

a. Quality Engineering

1. Review and evaluation were conducted on adequacy of and compliance with the S-IC stage contractor's quality assurance procedures and requirements of the stage contract. Discrepancies found were brought to the attention of the contractor for corrective action. A major survey of the contractor's quality system, using NASA document SP-6003, "Quality Evaluation Procedures," was conducted during August. The following significant events occurred during the period:

(a) Review of the contractor's revised Quality Program Plan was completed.

(b) Considerable effort was expended on resolution of numerous quality problems in the contractor's electrical fabrication

area.

(c) Extensive review and follow-up were made to insure resolution of quality problems caused by Hurricane Betsy damage.

(d) Coordinated and assisted in the review of quality portions of the Cost-Plus-Incentive-Fee Contract to be negotiated with the contractor.

(2) Direction and assistance were provided to the contractor and his subcontractors and vendors in establishing and maintaining an effective, efficient, and timely procurement and source control program. Coordinated with MSFC Quality Assurance Representatives and other Government agencies, requests for source inspection and Quality requirements assigned on procurement documents. Coordinated and resolved quality problems at vendor activities. Field trips to vendor activities were curtailed during the period because of lack of travel funds.

(3) The contractor's quality data systems were reviewed and quality and reliability data were consolidated and evaluated to maintain constant cognizance of the quality level maintained by the contractor, and to detect and resolve problem areas. Significant activities during the period were:

(a) As a result of extensive effort by this office, the contractor agreed to furnish MSFC with complete failure data in the MSFC format, without additional cost.

(b) Established inspection stations by function in the contractor's plant areas.

(c) Improvements in the contractor's Quality Status Report as a result of Quality Engineering follow-up resulted in improved ability to measure effectiveness of the contractor's quality effort.

(d) Use of the contractor's internal quality audit and corrective action resources and procedures was expanded and intensified in the resolution of NASA-found quality deficiencies.

(e) A regular weekly presentation of contractor quality status was established for NASA management.

(f) A regular weekly report of outstanding quality problems and accomplishments was established for the MSFC Stage Manager and Quality and Reliability Laboratory.

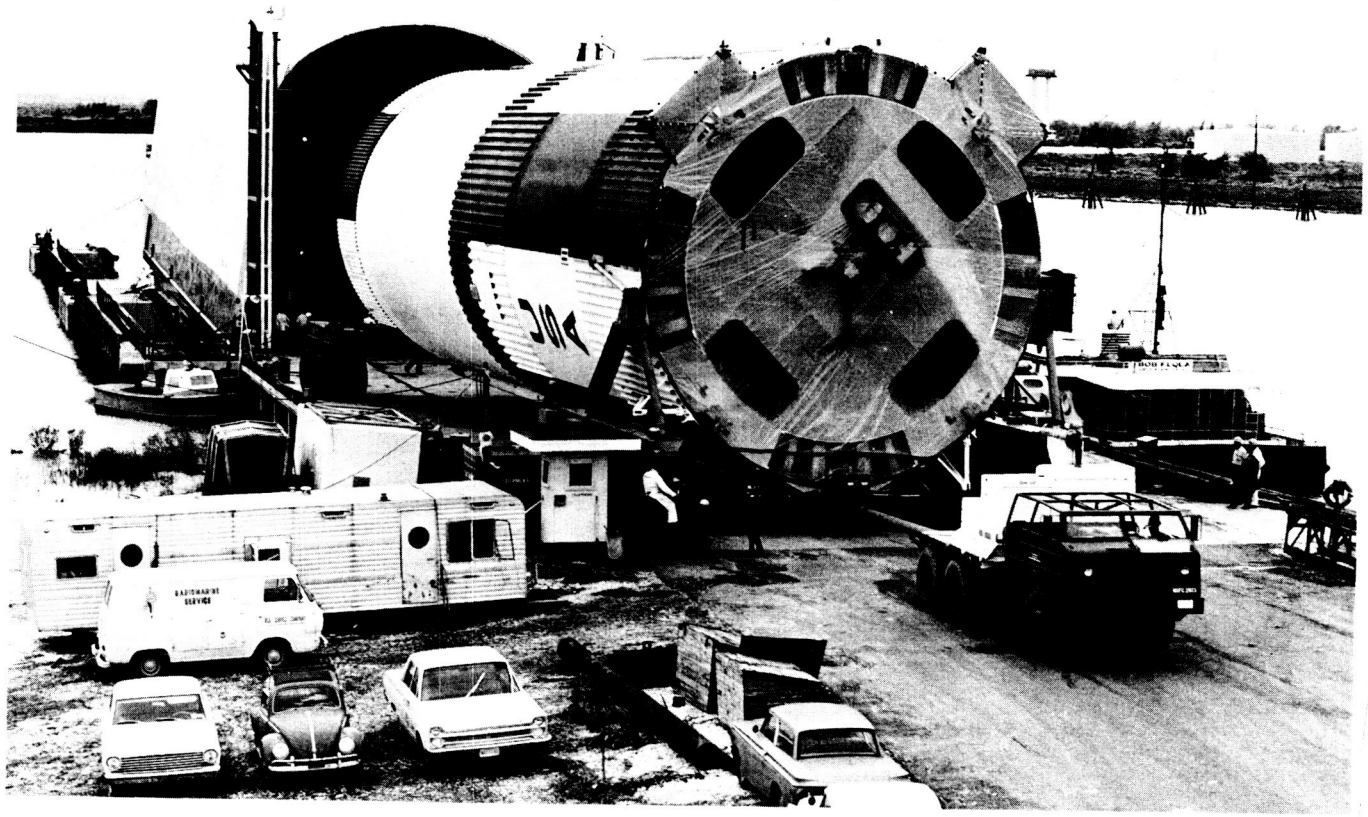
(g) Quality Engineering follow-up on quality trends and problems was intensified and broadened through use of new files and procedures.

(4) In the design evaluation area, engineering planning and direction were provided to insure that the contractor's quality assurance program provided for determination and inclusion of Quality Engineering requirements in drawings, specifications, and technical documents, for fulfillment of these requirements in functional, qualification, and reliability testing, and for improvement of design and quality through analysis of failures. The first flight F-1 Engines were received and test procedures, equipment, and test and buildup operations were closely monitored.

(5) In the product evaluation area, engineering planning, assistance, and direction were provided to the contractor to assure that Quality Engineering requirements were fulfilled during fabrication, processing, assembly, packaging, and shipment of Saturn boosters. The contractor's operating documentation and techniques were reviewed and evaluated, and direction was given concerning development of new techniques and correction of existing deficiencies. The following significant events occurred:

(a) Activation of the horizontal assembly area was completed.

(b) Systems checkout building was activated.



S-IC-D SHIPPED TO MSFC

The S-IC-D is shown being loaded onto the NASA barge Poseidon for shipment to MSFC. The S-IC-D will be mated with the second and third stages of the Saturn V space vehicle for tests to determine the flight characteristics of the 364-foot-tall rocket.

(c) S-IC-D was completed and shipped to MSFC.

(d) Planning was accomplished for implementation of First Article Configuration Inspection (FACI) on S-IC-3.

(e) Work was started on developing a revised philosophy of inspection processing for operation under the incentive contract.

b. Reliability

(1) Program Management

(a) The contractor's Cost-Plus-Incentive-Fee (CPIF) Proposal was carefully reviewed for its impact on the Reliability Program. The initial proposal contained little or no program coverage, however, agreement eventually was made to incorporate NPC 250-1, "Reliability Program Provisions for Space System Contractors" into the CPIF contract. A document D5-13510 was jointly written by Boeing and I-MICH-QR to implement NPC 250-1.

(b) Management of the Reliability Test Program was assigned by the contractor to the Manager of Reliability Engineering. Technical and management liaison with the contractor concerning reliability testing was established through I-MICH-QR. Responsible individual contacts with the various laboratories at MSFC also were established.

(2) Reliability

(a) A twenty-hour reliability training course, "Reliability for Management", was taught by ARINC at Michoud in November. The course was attended by NASA and contractor personnel. Attendees expressed a desire to schedule a repeat of the course for the benefit of other personnel. Development of a method for utilizing test data in the reliability assessment model received major attention by the contractor. A detailed review of the Math Model technique utilized by the contractor was made as well as a determination of why the Monte Carlo technique was chosen. A report of

the findings were furnished to I-V-SIC.

(3) Testing

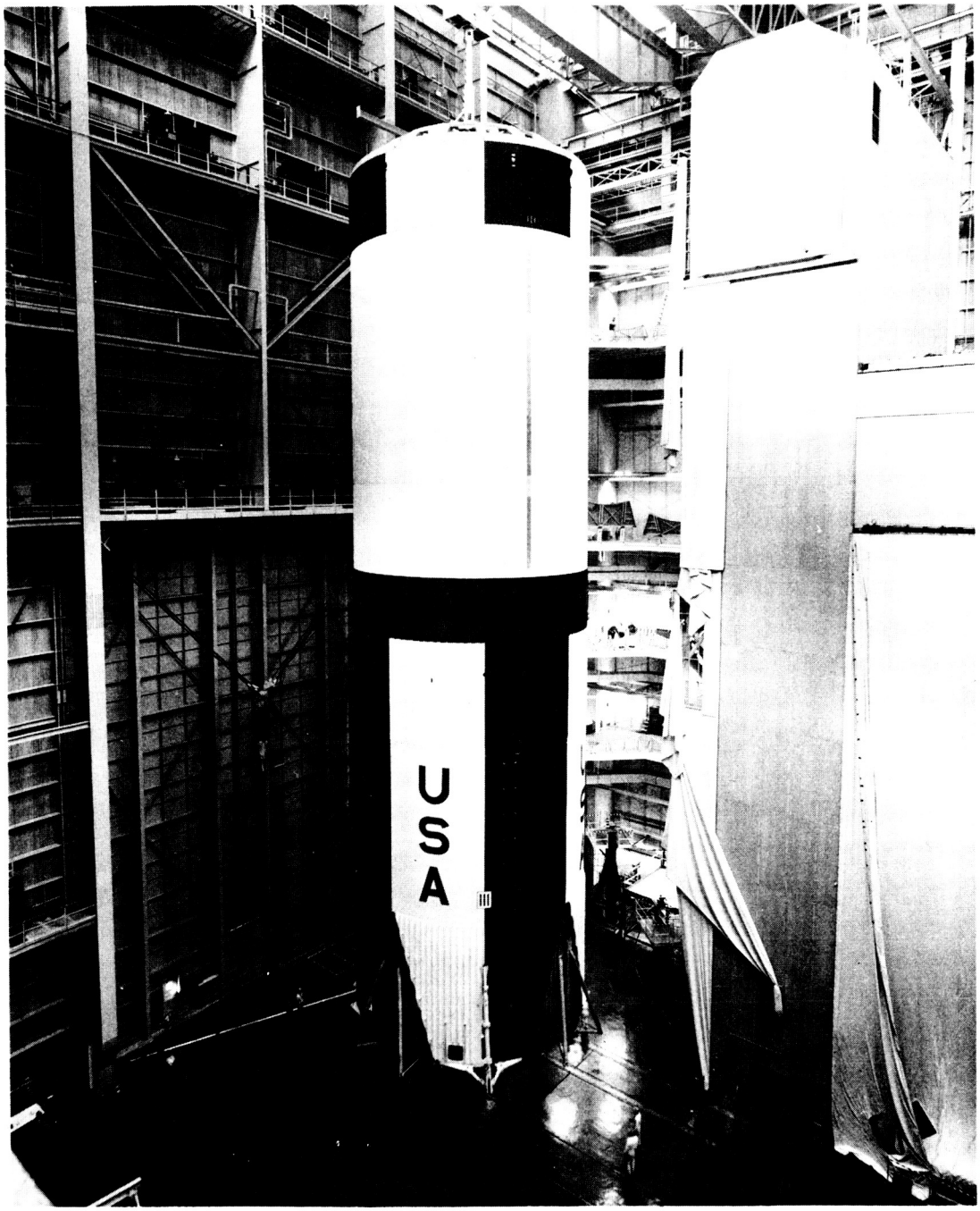
(a) About 60% of all the reliability test requirements were released by the contractor during the period. Completion of test requirements and test hardware delivery became a controlling factor in the test program. An "S-IC Reliability Test Program Plan" document D5-11928-2 was written and accepted by NASA in November.

(b) In accordance with the test schedule, two reliability tests were started. Efforts to obtain a helium recovery system to support testing was discontinued after considerable expenditure of research on the subject. Helium for testing which has been estimated in excessof 100,000 pounds will have to be delivered by truck on a closely coordinated schedule in order to avoid delays in testing.

c. Product Control Engineering

(1) Hurricane Betsy struck the Michoud Assembly Facility on September 9, 1965, causing extensive damage to the Boeing stage test facility. The esterior walls on cells #2 and #4 were completely blown away and extensive roof damage was incurred. Cells #1 and #3 received moderate damage. Cell #2 was the first cell scheduled to be activated and was about 80% complete; however, because of the time required to repair the facility it was decided to activate cell #1 first. All of the Ground Support Equipment was moved from cell #2 to cell #1. Repair of the entire facility was 90% complete at the close of the reporting period.

(2) The Dynamic Test Stage, S-IC-D, was moved into test cell #1 on August 24, 1965 for checkout prior to shipment to Marshall Space




AN S-IC BOOSTER IN THE VERTICAL ASSEMBLY AREA AT MICHOUD

One of the first Saturn V boosters built at Michoud is shown in the vertical assembly area undergoing final assembly.

Flight Center. Since this vehicle contained mostly dummy components, the Ground Support Equipment was not required. Special test equipment was used to pressurize tanks, etc. Checkout was completed and the stage was loaded on the barge October 5, 1965 and departed New Orleans, Louisiana, on October 6, 1965.

(3) The Facility Test Stage, S-IC-F, was moved into test cell #1 on November 19, 1965, for post-manufacturing checkout prior to shipment to Kennedy Space Center. Parts shortages have impaired the checkout; however, it was on schedule and due to be loaded on the barge at Michoud January 13, 1966. Checkout of the S-IC-F stage is being accomplished in the manual mode.

(4) S-IC-503 booster assembly, the first Michoud-built flight vehicle, was in final assembly at the close of the period, with no major problems. All five of the F-I engines for the "503" vehicle had been received and were in process of functional test checkout. A successful demonstration of engine installation and removal was conducted on the Facility Test Stage by Boeing personnel to ensure proper and safe installation for flight vehicles.

(5) The general outlook in the structural assembly area over the past six months was considered good, with the quality of contractor's work improving, and some "zero defects" being achieved. All major assemblies were on schedule, with no major problems. Foundations and facility modifications were under way for the installation of a new 45-ft diameter boring mill to be in operation or or about March 25, 1966.

(6) With the delivery of backlogged components, assemblies, and materials for Manufacturing Engineering Laboratory fabrications of SA501, SA502, and Ground Support Equipment for R-Test and R-QUAL laboratories, the

Boeing Company's operations in the Component and Ground Support Equipment fabrication areas came off the peak work load experienced for approximately eighteen months. Work loads and efforts appear to be approaching a normal level with an accompanying increase in quality, and one "zero defect" Ground Support Equipment panel has been presented. Components, assemblies, and materials are being processed for Boeing built flight vehicles. All principal facility requirements have been accomplished and no major modifications or changes are apparent at this time for continuation of the work in the component and electrical/electronic fabrication areas.

3. Contracts

a. NAS8-5608

(1) The Boeing Company Contract NAS8-5608 was modified and increased in value during this reporting period in the amount of $64,343,180 through Modification MICH-112 and MSFC-61 (excludes modifications MICH-110 and MSFC 42, 43, 45, 46, 52 and 55). Fifty-one modifications to the contract were issued during this period. Supplemental Agreement MICH-110, which provides for conversion from cost-plus-fixed-fee to cost-plus-incentive-fee type contract was forwarded for approval to NASA Headquarters on December 29, 1965. The cost effective date of Supplemental Agreement MICH-110 was July 2, 1965. The total estimated cost-plus-fixed fee and target fee of Schedule I (S-IC Stage) from January 1, 1963, through completion on October 30, 1969, is $850,114,303, as of this date. The increase in value of $64,343,180 in NAS8-5608 provided the following:

Schedule I

(a) $22,992,639 - Incorporates Plan VII

(b) $ 822,155 - Manufacture and assembly of one test panel Intertank Assembly S-IC Servo-Actuator Analysis and Test Program

(c) $ 257,734 - S-IC Internal Tank Access Equipment for MILA

(d) $ 5,058,305 - Flight Control Systems, Provide DRL's and DRD's, S-IC Stage Criteria Document, F-1 Engine Test and C/O Equipment and various CAM's

(e) $ 176,183 - Skin Panel and Umbilical Door, Hydrogen Explosion hazards in S-IC Stage for Skin Section, and CAM 254

(f) $ 2,273,204 - Gas Generator Spark Ignition, CAM 828 and 305, Revised Exhibit G, TD I-V-SIC-253, Revised S-IC Stage Description

(g) $ 485,522 - CAM 806

(h) $18,368,963 - Increase Part IX Manufacturing Support to MSFC

(i) $ 2,403,907 - Revised DDAS Tape Recorder and tuning equipment. Implement Phase I design criteria for GSE, S-IC test and QC complexes

(j) $ 521,811 - Mechanical Automation Breadboard

(k) $(1,156,828)- System Engineering and Integration Support transferred to Schedule II

(l) $ 991,670 - Special Handling Equipment for MILA

Schedule II

(a) $ 4,514,295 - Saturn V MGSE Technical Evaluation and recommendations

(b) $ 1,156,828 - Systems Engineering and Integration Support transferred from Schedule I

(c) $ 326,331 - Processing of Undimensional Master Drawings and Patterns/Saturn V Component Qualification Assurance Programs

(d) $ 1,243,327 - DTV Phase I Extension "Pre-test Analysis and Test Planning"

(e) $ 1,716,344 - Saturn V Operations Analysis

(f) $ 520,466 - Logistics Support Facility at MSFC for MGSE and related spares/Exhaust Flame Propagation Effects Study

(g) $ 1,657,447 - Saturn V Systems Development Breadboard Facility

(h) $ 12,877 - Training Film

(2) A supplemental agreement was negotiated on December 3, 1965, with The Boeing Company to establish a Schedule III "Saturn V Launch Operations Support." The purpose of Schedule III is to allow work presently being performed under Schedule I, Part VII to be removed and transferred into Schedule III.

(3) Contract modification to incentivize Schedule I of Contract NAS8-5608 amounted to $254,927,071, and was in NASA Headquarters for review and approval at the close of the reporting period.

(4) FY 66 funding of Contract NAS 8-5608 was as follows:

(a) Incremental R&D funding for both Schedules I and II during this report period against FY 66 requirements as $172,429,070.

(b) C of F funding for Plant Modification was decreased $25,949.70 during this period to a revised contract total of $13,492,357.30.

b. NAS8-5606(F)

(1) Purchases of facilities were vouchered and/or approved in the amount of $381,645 for Contract NAS8-5606(F) with The Boeing Company during this period.

(2) NAS8-5606(F) for facilities equipment to support the S-IC program reflected no change in the contract value during the report period. However, a contract modification for additional facility equipment items in the amount of $3,270,000 has been forwarded to NASA Headquarters for approval. No contract funding was provided during the reporting period.

4. PERT

a. The Boeing Company implemented additional networks for the S-IC-4

through S-IC-10 Vehicles during the period. The S-IC-D PERT Network was completed on October 25, 1965, with arrival of the stage at MSFC on October 15, 1965, as scheduled.

b. PERT schedule assessment at the close of this report period forecasted the S-IC-F to be delivered to KSC on January 21, 1966, as scheduled. The S-IC-3, S-IC-4, and S-IC-5 vehicles are forecasted to be from nine to twelve weeks late to schedule, and are being paced by late deliveries of GSE equipment and specialty hardware. Work-arounds and expedited parts deliveries are being utilized by Boeing in order to insure that the vehicles meet major milestones.

c. The GSE for MSFC PERT networks were completed on September 27, 1965, as scheduled.

d. Boeing PERT networks as of the end of this period contained a total of approximately 9,000 activities.

D. Engine Office

1. The decision on uprating H-1 engines beginning with vehicle S-IB-6 was finally made, resulting in a target thrust of 205K for these and subsequent engines. Engines were installed during this reporting period on vehicles S-IB-4 and 5.

2. An attempt by the United Auto Workers Union to organize the local Rocketdyne technicians failed by a 2 to 1 vote. Rocketdyne reached their peak personnel staffing during this period, which ended with a total of 32 Rocketdyne employees at Michoud.

3. Efforts of the Engine Office resulted in the following major policies:

a. Single F-1 engine checkout will be accomplished after engine buildup only.

b. Mr. A. G. Smith, Assistant for Quality Assurance and Reliability,

c. R-QUAL-AT philosophy at MSFC is not to resort to teardown, disassembly, or removal of engine components during stage checkout.

4. Rocketdyne took beneficial custody of their office and warehouse facilities in the plant area. The Rocketdyne CM&R facility is complete except for plumbing in the G3141 component console. The targeted completion date is 1/15/66.

5. The three G3142's, engine checkout consoles, were received during this report period. One of the units was operational; plumbing and electrical tie-ins were started on the second unit. The anticipated completion date for this unit was January 10, 1966.

6. During October, Boeing attempted to install FM-105 into position on S-IC-F. Several practice runs were conducted using the engine installer tool and the engine simulator, without incident. However, after lifting

FM-105 from the dolly and positioning it on the stage, the installer tool could not be removed. Boeing then resorted to unwritten procedures to remove the tool. After removal of the tool, extensive thrust chamber tube dents were observed in the areas where the installer tool contacts the engine. Boeing then instigated a study in an attempt to improve both the configuration of the installer tool and its operating procedure. On December 16th, after incorporating both design and procedural changes, the tool was successfully used in another trial run with FM-105, and since that time, other familiarization exercises have continued.

7. S-IC-F was in stage checkout at the close of the reporting period, and scheduled to complete stage checkout on 1/3/66. Following stage checkout, it will be brought back to horizontal assembly, at which time FM-105 will be installed prior to shipment to MILA.

8. All S-IC-3 engines were received, completed receiving inspection, and the four outboard engines were in buildup at the end of the year. The center engine, F-4024, had completed buildup and was in post-buildup checkout. The checkout of this engine was hampered somewhat due to problems in activating the first G3142 console and delinquent Boeing-procured hardware. At the close of the reporting period, the Engine Office was informed that engine F-4027 would be substituted for engine F-4023, the spare for S-IC-3. Engine F-4027 was scheduled for delivery to Michoud on January 3, 1966. S-IC-3 was in horizontal assembly at the end of the year, and unless unforeseen problems arise, all S-IC-3 engines should be available for installation on schedule.

E. Documentation Office

1. One of the greatest obstacles to be overcome in a manufacturing center is to get the engineering definition from the designers board to the user. The Michoud Assembly Facility has shown remarkable progress in overcoming the problem of the time required in getting the release, reproduction and distribution of engineering documentation into the hands of the user.

2. For the calendar year 1963 (initiation of release program), the average flow time (from off-board to complete distribution) was 47 days. In 1964, this time was reduced to 12.2 days. n 1965, the flow time was further reduced to 6.1 days with the average flow time during the last six months being only 4.9 days. The reduction of flow time was accomplished although the volume of reproduction processed increased from 2,002,750 sq. ft. in 1963 to 5,862,055 sq. ft. in 1964, and further increased to 11,011,713 sq. ft. in 1965.

## CHAPTER IV

## SUPPORT ACTIVITIES

### A. Contracts

#### 1. NAS8-14017

Mason-Rust Contract NAS8-14017 was modified and increased in value during the report period in the amount of $164,016 to cover the "Award Fee." This was the fee recommended by the Performance Evaluation Board and approved by the Fee Determination Official, covering the first five months' performance. This increased the total contract value (through Mod 19) to $11,207,736. Incremental FY 66 funding in the amount of $6,709,380.38 was provided during the reporting period. During July, 1965, a letter requesting the approval to exercise the option of Contract NAS 8-14017 for one year with Mason-Rust for support services was forwarded to MSFC. Approval was granted by NASA Headquarters on November 3, 1965, with provision for initiation of a modification to the contract for NASA Headquarters approval. Within one week, the modification was forwarded to MSFC. Approval had not been received at the close of the year.

#### 2. NAS8-5618

Mason-Rust Contract NAS8-5618 funding was decreased during the period in the amount of $12,809.86 to a revised contract total of $19,010,978.26.

#### 3. NAS8-4019(F)

Mason-Rust Contract NAS84019(F) for acquisition and accountability of Government Furnished Property was increased by $176,429 to a revised contract total of $2,347,392. Funds were provided for the contract increase and the contract was fully funded at the end of December, 1965.

#### 4. Other

During this report period, funds were provided for the following in

support of Michoud:

a. $750,000 - Utilities

b. $504,500 - Communications

c. $ 4,000 - Packing, Crating, and Handling

d. $ 40,000 - Navy Printing

e. $ 208 - M52 Truck Tractor repair parts

f. $ 23,636 - Boring Mill and Watertown Arsenal supporting services

g. $ 20,000 - Federal Telecomputing System (FTS) terminating at The Boeing Company, Seattle, Washington, and Michoud Assembly Facility, New Orleans, La.

h. $ 97,049 - Helium for GFP to Contract NAS8-5608

i. $ 15,425 - Gasoline GFP to Mason-Rust under Contract NAS8-14017

j. $ 325 - Locks and blanks for Michoud lock and key system

k. $1,670,348 - Roof rehabilitation and repair of damages caused by Hurricane Betsy.

B. Safety

1. Meetings and/or Conferences

a. A special meeting was held with contractor general superintendents on all construction contracts, and the prime contractors, namely, Boeing, Chrysler, and Mason-Rust, were also notified of the necessity for better control of contractor operations in order to forestall serious injuries and especially fatalities. Pre-construction meetings were attended by the MAF Safety Officer on all construction contracts let during the reporting period. Attention of contractor representatives at these meetings was called to their responsibilities and obligations regarding safety within terms of their contract

b. The Safety Officer attended the Federal Safety Conference and the National Safety Congress held jointly in Chicago in October, 1965. The general

theme for the Federal Safety Conference concerned the Mission Safety-70 program as promulgated by the President of the United States. The program was implemented at MAF.

c. Central Safety Board meetings were held as scheduled and required by Michoud Instruction I-MICH 23-5.

d. Civil Defense meetings held in accordance with general requirements and as specified in the charter for the Michoud Civil Defense planning organization.

2. Inspections and/or Surveys

a. Safety inspections or safety surveys were made of the various contractor areas, including construction sites, at irregular intervals. These inspections and surveys were made both at the Michoud Assembly Facility in New Orleans, and at the Slidell Facility, and results of inspections were recorded.

b. MSFC survey of the Michoud Assembly Facility was conducted by representatives of the MSFC Safety Office during the month of November. Findings and recommendations resulting from this survey were disseminated to the various prime contractors and the MAF Facilities office. Replies from these organizations will be consolidated for reply to MSFC.

c. Construction plans being formulated by an architect-engineer organization under contract were reviewed by the MAF Safety Officer, who represented the MSFC safety office on two of these occasions. One instance involved alterations or renovation of utilities at the MAF installation, and the installation of subsurface drainage. A number of engineering plans for renovation or alteration of areas assigned to Boeing and Chrysler submitted by the MAF Facilities Office to the MAF Safety Officer were also reviewed.

3. Reports

Monitor reports on appropriate appendices of the support services contract (NAS8-14017) were submitted on a regular basis, as required. A special report on Hurricane Betsy was prepared by the Support Services Contractor based on information furnished by the MAF Safety Office and in close parallel to the Hurricane Hilda report compiled by the MAF Safety Office.

4. Publications

Safety publications, new or revised, were published, as follows:

New

| MAF Instruction Nr. | Subject | Date |
|---|---|---|
| M-1-3 | Emergency Zones | Sept., 1965 |
| M-1-8 | Personal Protective Equipment | Oct., 1965 |

Revised

| | | |
|---|---|---|
| M-1-4 | Requesting and Furnishing Assistance in Emergency Situations | Sept., 1965 |
| M-1-7 | Christmas Observances | Dec., 1965 |
| M-1-9 | Accident, Injury, Property Damage, and Statistical Reports | Dec., 1965 |

5. Safety Program Results

The accumulated frequency rate ending the year 1965 for the entire Michoud Assembly was .35 or about 1/3 of one injury per million manhours worked. This frequency resulted from a combined total of seven lost-time injuries against an exposure of nearly 22 million manhours. This compares quite favorably with a frequency for the year ending December 1964 of 1.15 or 1 and 15/100 injuries per million manhours exposure, at which time the year-end total of lost-time injuries was 24. This constitutes a reduction

of 70%. This enviable record can be attributed to greater effort on the part of both management and the safety departments of the various operational segments and a greater willingness on the part of employees to accept the safety program provisions, coupled with a better attitude on the part of both employees and supervisors. During this same period, the number of non lost-time or first aid types of injuries was reduced by nearly 50%. This greater achievement directly ascribed to safety performance has resulted in an automatic benefit through greater efficiency, better morale, increased productivity, and improved general performance in all areas of endeavor.

6. Miscellaneous

a. The MAF Safety Officer was appointed to serve as the Michoud Assembly Facility representative on the Metropolitan New Orleans Safety Council for another one-year period.

b. One serious injury occurred during the reporting period, involving a support services contractor employee. There were only four lost-time injuries experienced during the six-month period, one of which was a permanent partial disability sustained when a pressure vessel exploded, causing extensive bodily injuries to the aforementioned employee.

c. Fire Prevention Week during the month of October was promoted extensively at the Michoud Assembly Facility. The Chrysler Corporation Space Division Safety Division, and the MAF Safety Office promoted this observance through posters, publications, and the sale of safety cans and fire extinguishers.

d. The Michoud Assembly Facility was awarded a plaque from the Metropolitan New Orleans Safety Council "for their outstanding safety achievement during 1964-1965 period".

C. Security

1. The NASA-sponsored 35th Symposium on Shock and Vibration conducted by the U. S. Naval Research Laboratory was held in New Orleans. MSFC was host to the symposium, which consisted of both classified and unclassified sessions. The MAF Security Office coordinated the required support, which was furnished by the Support Services Contractor.

2. All MAF Instructions pertaining to security functions are in the process of review by the MAF Security Office. Several instructions have been re-written or revised and a schedule promulgated for the remainder.

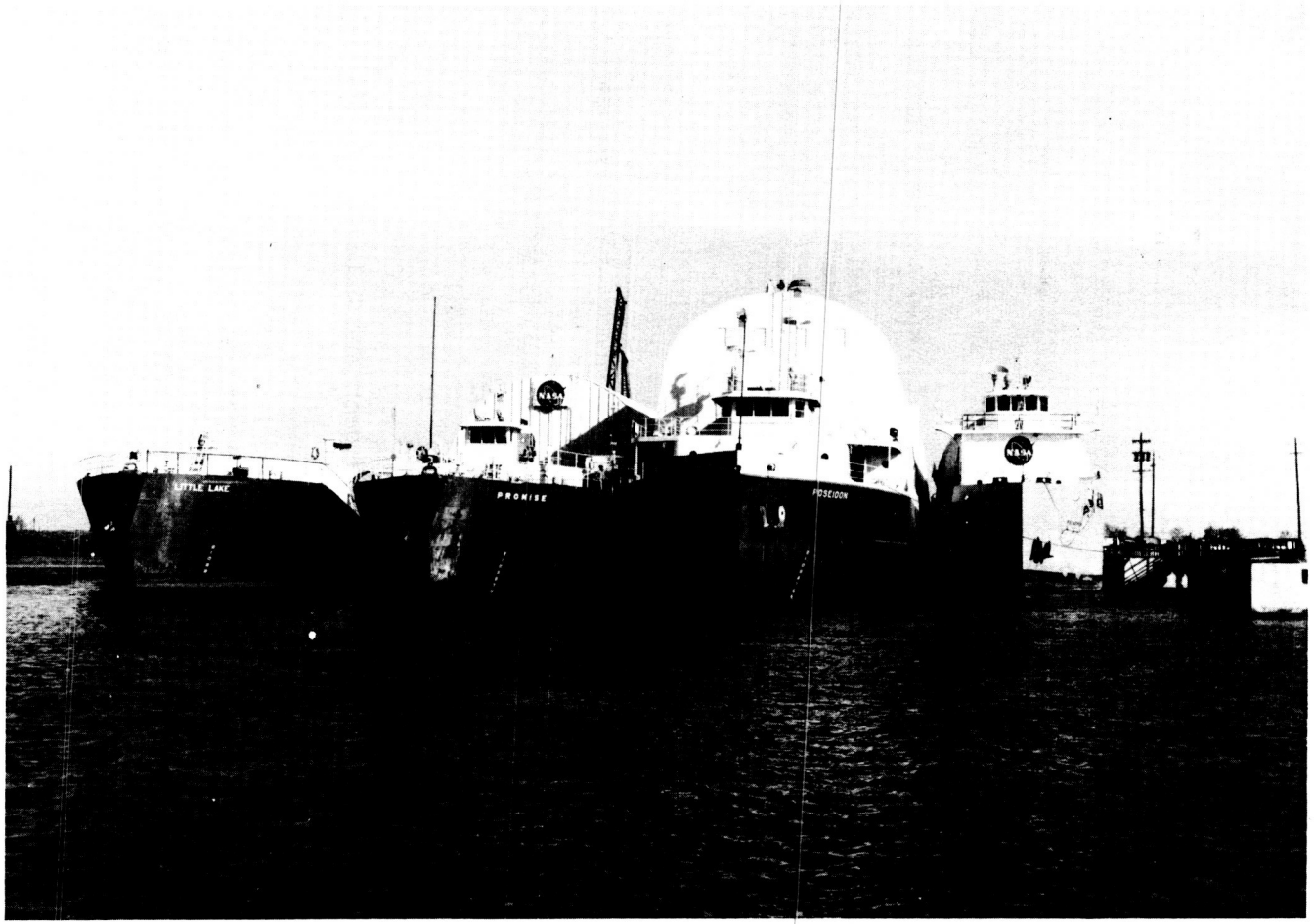
3. The Michoud Assembly Facility began re-registration of vehicles of NASA personnel and contractor personnel. This re-registration was scheduled to coincide with the issuance of state license plates for vehicles.

4. The MAF Security Officer was appointed cryptographic custodian for the Michoud Assembly Facility account.

5. Colonel Gould, member of the U. S. House of Representatives' Committee on Science and Astronautics, visited the Michoud Assembly Facility during the reporting period. The MAF Security Officer briefed Colonel Gould and his staff on security matters at this facility.

6. With the completion of the paving and marking of all parking lots at MAF, the parking problem was virtually eliminated.

7. With the approval of NASA, the Support Services Contractor employed New Orleans Police Department personnel to direct traffic at Gates #7 and #12. The New Orleans City Traffic Engineer's Office has indicated that the City will not install traffic lights on Old Gentilly Highway, but would maintain such lights after the Government bears the cost of installation. At the close of the reporting period, a decision was being awaited regarding




FOUR OF FIVE SPECIAL BARGES FOR SATURN TRANSPORT

The unique NASA vessels (left to right) are the Little Lake, one of two shuttle barges used to ship S-IC stages between Michoud and Mississippi Test Facility; the Promise, which carries the uprated Saturn IB first stages from Michoud to Kennedy Space Center; the Poseidon, designed to move Saturn V first and second stages to and from MSFC's Michoud and Huntsville locations and to KSC; and Palaemon, used to ransport uprated Saturn IB S-IB stages to and from MSFC's Michoud and Huntsville locations.

installation of the traffic lights.

8. No NASA security violations were reported during the calendar year 1965.

D. Support Services

1. The Michoud Harbor handled twenty-two barge shipments of components, transporters, and miscellaneous cargo, ten stages by barge, one shipment in and one shipment out on Navy LSD Point Barrow.

2. Five F-1 engines were unloaded at the Naval Air Station from the "Pregnant Guppy."

3. All of the contractor-furnished trucks, except one stake-and-platform with hydraulic tailgate, were replaced with Government-owned trucks. Trucks received in December included one dump truck, four one-ton vans, and two stake-and-platform trucks with dump bodies.

E. Administrative Services

1. General

Federal Housing Act - Section 809 Program. Activity continued under this program, with 102 applications for Certificates of Eligibility received and 94 certificates issued during the reporting period.

2. EEO Program

No problem areas of any significance have been encountered in implementation of this program at MAF, and progress commensurate with goals has been achieved. Implemtnation of the Equal Employment Opportunity Program has been a matter of continuing and conscientious action on the part of the management, staff, and employees of MAF. Adherence to the principles of the program is maintained in all operations, and specific attention is given the program in public affairs activities (contacts, speeches, displays, etc.) and in personnel activities. In initially taking action under the program, the principal difficulty was in obtaining qualified applicants from minority

groups for position vacancies. As a result, affirmative action was concentrated largely on attempts to assist and inspire members of minority groups to acquire necessary skills through education and training. Efforts to inform adult leaders and to interest young members of minority groups in careers in the space program, and in obtaining necessary education and skills to permit such participation have included speeches, displays, tours and presentations to minority or predominantly minority groups. Such activities during this reporting period included tours by 48 Dillard University students and briefings on Michoud on July 2, 9, 16, and 26, 1965, and tours and briefings for 32 students from Southern University on July 21st, and for 48 parents of students attending the Helen S. Edwards Elementary School on August 5, 1965.

F. Management Analysis

Eight MAF management instructions were published under the new format during the reporting period and eleven were in various stages of staffing at the end of 1965. Proposed organizational manual was drafted in implementation of the Charter for the Michoud Assembly Facility. The primary purposes of the MAF Manual are to formalize the means by which the Manager makes internal assignment of basic, continuing mission responsibilities; to identify in detail functions and subfunctions, and to delineate relationships among organizational elements; and to clearly establish the nature and extent of authority and responsibility for each function.

G. Personnel

a. Total personnel on board at Michoud as of December 27, 1965, was as follows:

| | |
|---|---|
| NASA | 279 |
| Boeing | 5,925 |
| Chrysler | 3,288 |
| Mason-Rust | 946 |
| TSI | 213 |
| Total | 10,651 |

b. The number of personnel on board in each organizational element as of January 3, 1966, was as follows:

| | |
|---|---|
| Office of the Manager | 4 |
| Programs Office | 6 |
| Contracts Office | 30 |
| Facilities Office | 11 |
| S-I/IB Stage Operations Office | 9 |
| S-IC Stage Operations Office | 9 |
| Engine Office | 3 |
| Support Operations Office | 29 |
| Computer Operations Office | 7 |
| Financial Office | 10 |
| Documentation Office | 7 |
| Public Affairs Office | 3 |
| Counsel Office | 2 |
| Assistant for Quality Assurance and Reliability | 10 |
| Quality Engineering Office | 43 |
| Reliability Office | 6 |
| Product Control Engineering Office | 91 |
| Total | 280 |

c. At the close of 1965, less than 6% of total Michoud positions remained to be submitted to MSFC under the Position Review and Evaluation Plan.

d. Personnel service support from MSFC was reported as a major problem area of the last report period. A marked improvement in classification action on vacant positions resulted after assignment of Mr. Hillard Barkley to handle Michoud classification actions. Appointment of Mr. Robert M. Able, MSFC, as Mr. Sanderson's personal representative to Industrial Operations on all personnel management matters was expected to further alleviate problems in this area.

## CHAPTER V

## FACILITIES MANAGEMENT

### A. Construction of Facilities Summary

1. The following C of F funds were provided Boeing during this reporting period: $25,950 (FY 64) decrease; purpose, Additions to Production Facilities; Project 6309.

2. During this reporting period, there were no funding actions, neither C of F nor R&D, affecting C of F Projects related to Mason-Rust Contracts.

3. The following NASA (MSFC) Contractors, whose activities are managed by MSFC, were provided C of F funds as indicated:

| Contractor | Contract | Purpose | Project | Funding |
|---|---|---|---|---|
| Mid-Wesco Enterprises | NAS8-12090 | Additions to Production Facilities | 6309 | $89,419(FY 64 |
| R. B. Tyler Co. Inc. | NAS8-15010 | Engineering Bldg.(Michoud) | 6308 | 4,743(FY 63) |
| R. B. Tyler Co. Inc. | NAS8-15010 | Parking & Security Improvements | 6310 | 16,330(FY 64) |
| R. B. Tyler Co. Inc. | NAS8-15010 | Road and Airstrip Rehabilitation | 6311 | 21,566(FY 64) |
| R. B. Tyler Co. Inc. | NAS8-15010 | Vehicle Component and Supply Bldg. | 6312 | 10,480(FY 64) |
| Granite Construction Co. | NAS8-15004 | Vehicle Component Supply Bldg. | 6312 | 28,549(FY 64) |
| Quinn Construction Co. | NAS8-15008 | Additions to Production Facilities | 6309 | 301(FY 64) |
| Fruin-Colnon Co. | NAS8-15036 | Engineering Building - Michoud Plant | 6308 | 1,252(FY 63) |
| S.I.P. Inc. | NAS8-15013 | Additions to Production Facilities | 6309 | 21,307(FY 64) |

| | | | | |
|---|---|---|---|---|
| Fruin-Colnon Co. | NAS8-15036 | Facility Additions and Extensions To support S-IB and S-IC Production | 6315 | $10,688(FY 65) |
| Continental Engineers | NAS8-15017 | Engineering Building - Michoud | 6308 | 34(FY 63) |
| Quinn Construction Co. | NAS8-15026 | Central Computer Extensions and Alterations | 6316 | 11,035(FY 65) |
| Pittman Construction Co. | NAS8-15048 | Facility Additions and Alterations to support S-IB and S-IC Production | 6315 | 8,622(FY 65) |
| Mid-Wesco Enterprises Inc. | NAS8-15064 | Additions to Production Facilities | 6309 | 3,649(FY 64) |

B. Maintenance and Operations

1. The following Support Services R&A projects were completed:

   a. Air Curtain for South Overhead Door - Mfg. Bldg. 103

   b. Michoud Assembly Facilities Guardhouses for Gates 5 and 7

   c. Access to Plant Roof, Mfg. Bldg. 103

   d. Power Line to Guardhouse at Gate 3 and the Barge Dock

   e. Installation of Audio-Visual Equipment, Auditorium of Bldg. 350

   f. Improvements to Main Pumping Station

   g. Alterations and Extensions to Michoud Paving - Phase II

   h. Improvements to Landscaping, Drainage

   i. Alterations to Toilet - Mfg. Bldg. 103

   j. Modifications to Air Conditioning - First Floor, Central Computer Facility

   k. Installation of Robertson Camera - Bldg. 350

   l. Guardhouse and Fence Alteration for Saturn Boulevard East

   m. Air Conditioning for North Wall Offices - Bldg. 103

   n. Modifications to Drainage and Sidewalks, Visitors Parking Lot - Bldg. 350

o. Floodlighting of Walkways for South Parking Lot

2. The following Support Services R&A projects were let in Calendar Year 1965 and will be completed in Calendar Year 1966:

a. Primary Protection for Roof Substations

b. Replacement of Feeder Cables to Roof Substations

c. Auxiliary Lighting, Sound, Intercom and Signalling System - Conference Room - Bldg. 350

d. Alteration of Maintenance Paint Shop

e. Install Air Curtains for East and West Overhead Doors - Mfg. Bldg. 103

f. Improve Lighting in Main Boiler House

g. 220 Volt Outlets for Photographic Department

h. Surfacing of Area Around Bldg. 130

i. Improvements to Cafeteria and Dining Rooms - Bldg. 103

j. Improvements to Lobby - Bldg. 101

k. Grading and Landscaping to existing Manufacturing Area

3. The following Design Packages have been completed:

a. Modifications to Potable Water System

b. Filter Cleaning Station

c. Booster Hangar Roof

d. Modifications to Utilities Systems

e. Utilities Monitoring System

f. Modifications to Storm Drainage, Phase I

g. Modifications to Storm Drainage - Phase II

h. Structural Study, Bldgs. 101, 102, 103

4. Miscellaneous

a. On August 7, 1965, the roof of the new Vehicle Components Building under construction by the Granite Construction Company of Houston, Texas and

designed by August Perez and Associates of New Orleans, Louisiana, collapsed during a heavy rain storm. Damage to the roof and interior was approximately $100,000 and was covered by insurance of the contractor. Reviews of design have been made by various design firms and MSFC Design Group and as added safety features, Granite Construction Company is changing drain locations and adding scuffers to the building.

b. Hurricane Betsy hit Michoud from 8 p.m., September 9, 1965, through noon, September 10, 1965. The preparation work accomplished was a major factor in keeping damage cost to a minimum, but severe roof and building damage resulted from the storm.

The report shows an approximate cost of $2,183,141 to buildings and surroundings, and an additional program impact cost of $1,000,000. Two contractors were immediately called in to repair and rehabilitate the buildings. Tri-State Roofing Company of Knoxville, Tennessee for roofing was awarded a contract for $534,817 and J. A. Jones Construction Company of Charlotte, North Carolina for buildings was awarded contract for $1,130,531. The immediate response of these two contractors in protecting property after the hurricane reduced additional damage. Barge "Promise" was washed upon the levee and damaged to the amount of $89,138 which was repaired by Avondale Shipyards, Harvey, Louisiana.

A second major failure of the Chemical Waste Deep Well was experienced after Hurricane Betsy. The first major failure occurred in November, 1964. Installation of a second deep well in 1966-67 will substantially reduce causes for major failures. Since February 1964 over 165,000,000 gallons of chemical waste have been discharged via the deep well method.

c. Two major improvements were implemented in the Support Services Maintenance Department as a direct result from recommendations from the Michoud Facilities Office.

(1) Complete streamlining of the Preventative Maintenance Program

(2) Utilization of the area maintenance technique.

Both improvements have resulted in favorable comments from NASA Headquarters in addition to improved performance for the Support Services Contractor under the Cost-Plus-Award-Fee type contract.

C. Construction

1. The following NASA Construction Contracts have been completed:

a. NAS8-12090 - Midwesco Enterprises, Inc.
Modifications to Steam Plant

b. NAS8-15010 - R. B. Tyler Co., Inc.
Phase I, Roads, Parking Areas, Lighting and Rehab of Airstrip

c. NAS8-15036 - Fruin & Colnon, Inc.
Phase II, Roads, Parking Areas, Lighting and Rehab of Airstrip

d. NAS8-15013 - S.I.P., West Master Substations

2. The following NASA Construction Contracts were let:

a. NAS8-15076, Farrell Construction Co.
Extension to Saturn Marine Dock.
Estimated Completion Date - April 1, 1966

b. NAS8-17132, Pittman Construction Co.
Phase I, Modifications to Storm Drainage.
Estimated Completion Date - June 1, 1966

c. NAS8-15090, Tri-State Roofing
Emergency Roof Repairs, Hurricane Betsy
Estimated Completion Date - January 15, 1966

d. NAS8-15091, J. A. Jones Co.
Emergency Repairs to Facilities, Hurricane Betsy
Estimated Completion Date - January 15, 1966

3. The following contractor facilities have been completed:

a. Boeing

(1) Hi-Pressure Test Facility

(2) Engine Build-up Area

(3) Rocketdyne Area

b. Chrysler

(1) Phase IV Hazardous Test Facility

# CHAPTER VI

# CONTRACT AND FINANCIAL MANAGEMENT

## A. Contract Management

Contractual actions during the reporting period are discussed in this history under the programs to which they pertain. Contracts relating to support activities and computer operations are reported under those headings. Contracts let for repair of damages due to Hurricane Betsy, and other facility repairs are discussed in the Facilities Management section. Miscellaneous contract activities included:

a. A utility contract for gas and electricity which was under negotiation for approximately two and one-half years with the New Orleans Public Service Company was finalized and forwarded to NASA Headquarters on August 1, 1965. Approval was given on September 1, 1965.

b. NASA Construction and Architect-Engineer contracts awarded by MSFC and forwarded to MAF for administering for the period July 1, 1965, through December 31, 1965, totaled $946,559. This amount included $886,759 of construction contracts and $59,800 of Architect-Engineer contracts.

## B. Program/Budget Submissions

The Program Operating Plan (POP 65-3) was submitted to MSFC July 19, 1965. This submission provided time phasing of the FY 66 program, the final FY 67 budget submission, and runout requirements through project completion for R&D projects. On October 19, 1965, POP 65-4 was submitted to MSFC. This submission included the time phasing of the FY 66 program, the refined FY 67 budget submission and the runout requirements for R&D projects.

## C. Financial Management

### 1. Funding Activity

Fund certifications in the amount of $217,584,691, and vouchers for

$173,321,708 were processed during the period.

2. Surveillance of Construction Contracts

Approximately 1,300 payrolls for an average of 31 construction contracts were examined for compliance with the Davis-Bacon Act, Copeland Act, and the Fair Labor Standards Act of 1962.

3. Price Analysis of Contractors' Proposals

Price analyses were performed on 42 proposals for contract increases totalling $70,491,004, and they were recommended for acceptance and/or negotiated for $55,061,510. Five contract decrease proposals for $724,736 were negotiated in the amount of $727,862. Major effort during the half year was spent on conversion to incentive contract of NAS 8-4016.

4. Review of Subcontracts and Purchase Orders

Evaluations were performed on 135 subcontracts and purchase orders totalling $25,160,000 submitted by prime contractors.

5. Contract Cost Accruals

Contract cost accruals of $164,683,000 on an average of 335 program items were recorded during the period.

6. Cost Reduction and Control Program

Cost reductions of $161,189 were reported during the six months ending December 31, 1965. The largest item constituted a savings of $120,000 resulting from turning out lights when not in use.

7. Support Services Contracts

In addition to monitoring business aspects of the Mason-Rust contract, a Financial Office representative served on the Source Evaluation Board for selection of a computer services contractor.

8. Travel Budgets

To cope with the shortage of travel funds, travel budgets were established for each Richoud office, and each office chief was given the responsibility for accomplishing office functions within the travel ceiling for his office.

## CHAPTER VII

## COMPUTER OPERATIONS

### A. General

This period was characterized by very high level of computation activity, stability of general purpose digital equipment changes, and increased emphasis upon and changes in capability of data reduction and analog-hybrid equipment. Much work was devoted to short and long-range planning involving both equipment and building facilities. Digital computers were operated, with few exceptions, on a three-shift, seven-day-a-week basis; analog computers were utilized in excess of one shift, and data reduction equipment and multiple shifts as required by work load.

### B. Equipment and Operations

1. The IBM 1401 system at Building 350, Michoud Plant, and the IBM 1945 data transmission system were discontinued effective July 1, 1965. This equipment was replaced by an IBM 1440 serving as remote station to the IBM 7094/7040 system at Slidell at a cost savings of approximately $3,000 per month.

2. Conversion of the GE-225 in Building 350 to a GE-235 was completed and made operational July 7, 1965. This computer system is primarily utilized to support ATOLL.

3. The data reduction equipment supplied under contract by Gulton Industries successfully completed acceptance testing on July 12, 1965. This equipment, which is installed in Building 350, is used in the reduction of acoustical and vibrational data obtained from component testing.

4. A Univac 1004 Model A was delivered to the Computation Office on July 26 and was installed August 2, 1965, as a part of the LIEF network.

This system was placed on order by the Computation Laboratory at Huntsville and replaced the Digitronics 520 data transmission terminal.

5. The SC-4020 microfilm plotter, manufactured by Stromberg-Carlson successfully completed a 30-day acceptance test period on September 26, 1965. This device is a magnetic tape-to-microfilm digital plotter which is presently in use to provide graphical, tabular, and other display of data reduction, scientific, and management and engineering data.

6. The hybrid digital computing system procured from Raytheon under contract NAS8-15102 was delivered and installed at the Computation Office on November 29, 1965. The hybrid system will be used for space vehicle related simulations which require both analog and digital capabilities.

7. The capability of the overall Analog Computer Facility was increased in August by the addition of a Sangamo recorder/reproducer. This tape drive, whose most significant feature is the ability to produce fixed accurate delays between input and playback, is used as an input device to any of the existing computers and also as a system to produce variable delays in problem loops.

8. The Xerox Copyflo Model 3C went on rental as of August 19, 1965.

9. Work load increases were caused by the hurricane and by the Boeing strike in September. Hurricane Betsy caused an extended shutdown beginning at 1600 hours Thursday, September 9, 1965. Partial operation was resumed on Saturday and shut down again Sunday evening due to intermittent commercial power failures.

10. The semi-annual calibration of all Engineering and Maintenance test equipment was completed during the week of September 26, 1965.

11. RFQ for third generation computers was issued by MSFC on December 20, 1965. Technical proposals were to be received by February 14, 1966. As a

result of bids to be received, it is expected that all general purpose digital computers now installed will be replaced with the advanced equipment at greatly reduced rental costs.

12. Considerable study was devoted during November and December to the development of an interim plan for computation capability pending initial phase-in of third generation computers. Initial approval steps were taken on December 31, 1965, in order that coordination could be effected with building completion.

13. Contrary to experience of prior years, computer utilization remained at a high level throughout the Christmas season. Backlogs continued at an excessive level, making more imperative the finalization in interim plans to provide an adequate computation capability.

C. Contracts and Funding

1. Telecomputing Services, Inc. Contract NAS8-5614 was incrementally funded during the report period in the amount of $1,108,000.

2. Obligations for digital equipment rental, EAM rental and equipment maintenance, in support of the Computer Operations Office, Michoud Assembly Facility, during this period amounted to $3,873,215.

3. A procurement plan for the Computer Operations Services at Slidell, Louisiana was approved by NASA Headquarters on July 1, 1965, for a period of one year from January 8, 1966 through January 7, 1967 with an option to renew for three additional one-year periods. The Request for Proposal was reviewed by MSFC and then presented to the Source Evaluation Board for review in accordance with NPC 402 on August 10, 1965. The Request for Proposal was mailed to thirty-two sources for solicitation but only three sources proposed on September 17, 1965, the closing date. The proposals were

submitted to the Source Selection Board on September 20, 1965, and a presentation made to MSFC on their recommendations on November 5, 1965. On November 9, 1965, a presentation was made to the NASA Administrator, Mr. James E. Webb, who advised on November 10, 1965, his selection of Ling-Temco-Vought and Telecomputing Services, Inc. for competitive negotiations. Both firms were negotiated and another presentation made to Mr. Webb on December 15, 1965, with a selection of Ling-Temco-Vought on December 21, 1965. Representatives of LTV presented a talk and film orientation for employees of the incumbent contractor (Telecomputing Services, Inc.) on December 22, and began personal interviews with employees on December 27, 1965. The contract, a cost-plus-award-fee, has an estimated cost and maximum award fee of $1,846,418 for the period of January 8, 1966, through January 7, 1967. The present contractor, Telecomputing Services, Inc.'s contract was extended for thirty days through February 6, 1966, for phase-out services.

D. Facilities

Construction of the building addition continued.

# VIII

# MISSISSIPPI TEST FACILITY - HISTORICAL REPORT

January 1, 1965 - December 31, 1965

MTF HISTORY TABLE OF CONTENTS

LIST OF PHOTOGRAPHS

# CHAPTER I

## INTRODUCTION

The year 1965 was an active one for the National Aeronautics and Space Administration's Mississippi Test Facility. It was a year that saw the achievement of many of the MTF goals, including its greatest single event---the arrival and placement in the test stand of the S-II-T, all-systems test version of the second stage of the Saturn V space booster.

Major projects sprang up in all areas of the sprawling MTF complex and when the year ended the "achievement board" showed such accomplishments as the arrival by water of the fit-up fixture, S-II stage simulator, completion of a number of major construction works site-wide, activation of the lock and bridge complex and completion of seven and one-half miles of man-made canal.

Significant changes in the management of MTF also took place during the year. Jackson M. Balch was named site manager and head of an activation task force at MTF and former MTF manager, W. C. Fortune, was assigned the task of evaluating the modes of cooperation between the government-industry Saturn Rocket Team.

A gradual transition in personnel took place when the majority of construction workers ebbed and a majority of permanent employees came aboard at MTF. The high peak of employment was in August when personnel strength reached 6,299 persons. This total leveled off November to an approximate 4,800 employees.

In addition to employment and management changes, MTF technical systems, composed of three phases, made significant progress.

Phase I is 99% complete; phase II is 60% complete, and three of the six steps of Phase III are complete. Under the latter Phase, steps completed include Mobile Instrumentation Units, Components Facility, and Field Activation Instrumentation Calibration. The three other steps of Phase III, and their year-end status, are EI&M Laboratory, 99% complete; Sonics Measurement Facility, 29% complete, and Components Services Facility, 48% complete.

Major developments in Support Services played a key role in the events of 1965. The L&E Building was opened, the telephone building was activated and the cafeteria was opened.

Facility construction funds obligated at the end of the year totaled $235,289,000.00 and all land acquisition was completed.

The following dates and events highlighted the overall picture of MTF during 1965:

Jan 19 -- Employees of NASA and GE moved into the L&E Building.

Feb 8 -- Chaney & James Construction Co., Inc., of Richmond Texas was awarded a contract for construction of the stage storage and checkout building for the S-II stage of the Saturn V.

Mar 2 -- A contract for construction of the second position B-I of the S-IC test stand was awarded to Blount Brothers Corporation, Montgomery, Alabama.

Mar 16 -- The population of MTF passed the 3,000 mark for the first time.

May 6 -- Jackson M. Balch was named manager of MTF and head of the activation task force at MTF.

May 19 -- MTF ended its second year of construction with more than 4,000 employees.

Jun 28 -- The rocket test site opened its man-made waterways to receive its first "space age" hardware.

Jul 1 -- Mississippi Test Operations became the Mississippi Test Facility.

Jul 7 -- MTF employment soared over the 5,000 mark.

Aug 30 -- Rocket simulator was raised into the 200-foot tall static test tower.

Sep 9 -- Hurricane Betsy slammed into MTF but did little damage.

Oct 17 -- The first rocket arrived at MTF.

Oct 21 -- The world's first gas turbine powered tugboat was delivered to MTF.

Dec 9 -- NASA renewed its contract with GE to provide support services for MTF.

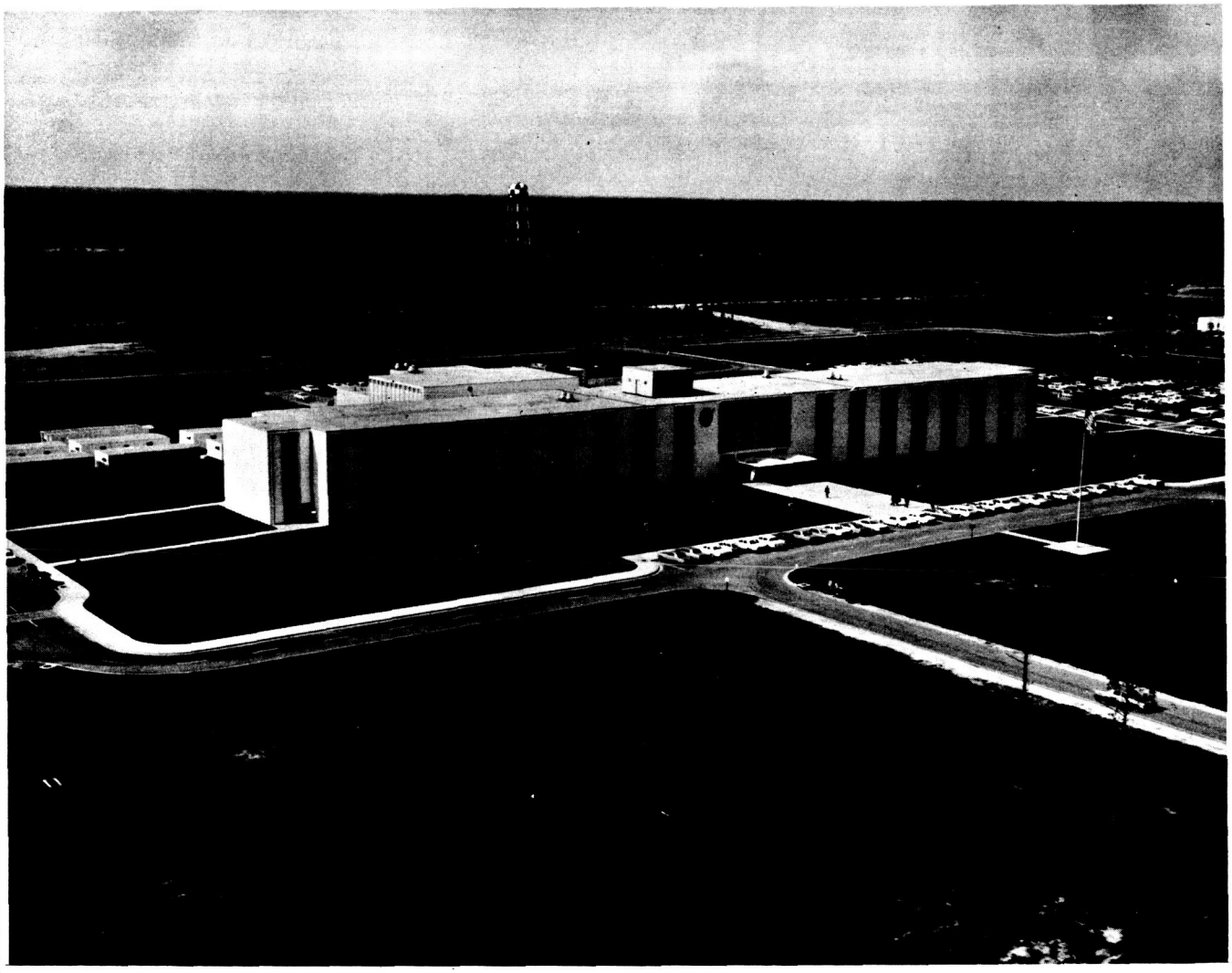


FIGURE 1

GAINESVILLE, Miss. -- The Office and Administration Building at the National Aeronautics and Space Administration's Mississippi Test Facility is one of the finished structures now contained on the 13,500 acre test complex. The building contains administrative and engineering offices and NASA's prime operating contractors as well as a clinic, cafeteria and other support facilities.

## CHAPTER II

## MANAGEMENT, ADMINISTRATION, AND PUBLIC AFFAIRS

### A. GENERAL SUPERVISION

The shift in emphasis from construction to activation became more pronounced at the first of 1965 when many activation oriented employees of NASA began to arrive at the Mississippi Test Facility. With the NASA personnel, also came employees of North American Aviation and the General Electric Company. Although the L&E Building was completed and occupied, the stage and support contractors' office space was at a premium, as well as NASA's, and many of the interim facilities were still in use.

When official announcement came on May 6 that Jackson M. Blach would be manager of MTF, the official NASA statement also made known a second responsibility which Balch would undertake. Namely, he was also to head an activation task force. The task force was formed from several elements of the Marshall Center which were concerned with the planning, construction and general activation of the site. The interim organizations which were working in these areas were formed into the task force responsible for conclusion of construction and installation of special equipment and facilities necessary to activate the installation. The task force also concentrated on the build-up of employees working at the test site. Overlapping of two functions--the completion of basic construction at MTF and the initiation of special equipment installation, coupled with the arrival of the first element of the permanent operations staff--was the build-up picture confronting Balch, former MSFC Asistant Deputy Director, Technical, when he took over the task force.

Shortly after Balch's appointment was announced, NASA assigned former MTF manager, W. C. Fortune, to the task of evaluating the modes of cooperation between the government - industry Saturn Rocket Team. This assignment was made known June 28.

Another significant administrative change occurred on July 1 when the test site was officially named the Mississippi Test Facility. It was formerly known as Mississippi Test Operations.

### B. POPULATION

Employment began to climb at MTF, finally reaching above the 6,000 mark. Most of these employees were General Electric personnel and personnel of GE's subcontractors, with North American, NASA, Boeing and construction workers rounding out the total. By the end

of the year, as various construction projects were completed, MTF population ebbed and leveled off to 4,600 persons. Year-end figures showed MTF employment standing at 158 NASA persons; 2,546 GE persons (including 100 Phase II and Phase III personnel); 792 GE subcontractors; nine U. S. Weather Bureau persons; 137 Boeing employees; 713 under North American; 13 Rocketdyne persons; 111 under the Corps of Engineers, six Sverdup & Parcel, and 1,130 construction workers.

## C. TOURS AND VISITORS

As MTF became closer to operational status, as roads improved and as the rocket proving ground began to attract attention locally and nation-wide, tours and visitors began to increase dramatically.

The Congressional visitors list included: Hon. R. Walter Riehlman, MC, New York (Feb. 6); Hon. Roy Taylor, MC, North Carolina; Hon. George E. Brown, Jr., MC, California; Hon. William R. Anderson, MC, Tennessee; Hon. Gale Schisler, MC, Illinois; Hon. Barber B. Conable, Jr., MC, New York (Feb. 12); Hon. O. S. Teague, MC, Texas; Hon. R. R. Casey, MC, Texas; Hon. E. Q. Daddario, MC, Connecticut; (July 24).

The 1965 visitors list also included top-flight NASA officials such as Captain Robert F. Freitag, Director, Manned Space Flight Field Center Development; Richard Callaghan, Assistant Administrator of Legislative Affairs Office; Col. Edmund F. O'Conner, Director of Industrial Operations, NASA-MSFC; Raymond A. Kline, Executive Staff, (Feb. 12); members of the NASA-Department of Defense Launch Vehicle Panel, M. W. Rosen, J. L. Sloop, A. O. Tischler, W. A. Fleming, A. M. Nelson, E. Z. Gray, all representing NASA, and Hans Heuter, NASA-MSFC; H. J. Weigand, Scientific Advisor, DCS/R&D; Captain C. C. Andrews, Bureau of Weapons, USN, and Major R. C. Fruge, Jr., USAF Panel Secretary, all representing the Department of Defense (March 24); Dr. Wernher von Braun, (July 15); Richard Callaghan, Assistant Administrator, Legislative Affairs Office, NASA; Hans Heuter, Deputy Director of Industrial Operations, NASA-MSFC; J. B. Bramlett, Deputy Director of Saturn V Projects Office, and James Murphy, Deputy Director of Saturn V Projects Office (July 24); Dr. George Mueller and Dr. Wernher von Braun (Aug. 6); General Schilt (Aug. 11); James Webb, NASA Administrator, Washington, who was accompanied by Dr. Arthur Raymond, Rand Corporation and NASA Consultant; Gen. Charles P. Cabell, NASA Management Consultant; Dr. C. Stark Draper, Head of Aeronautics and Astronautics, MIT, NASA Consultant; Gifford Johnson, President, Graduate Research of Southwest, NASA Consultant; Col. John Glenn, Astronaut and NASA Consultant; Gen. James McCormack, NASA Consultant; John D. Young, Deputy Associate Administrator of Administration, and Brian Duff, PA, NASA Headquarters, (Aug. 18).

Other outstanding visitors during the year included W. F. Parker, Vice President, North American Aviation, S&ID and S-II program manager, and A. C. Martin, S-II Test and Operations (Feb. 19); Harry LeVine, Defense Programs Division, General Electric Company, Washington, D. C. ; Rear Admiral D. C. Lyndon, USN, (Sept. 21), and a troupe of Apollo executives, including heads of companies with prime contracts on the Apollo program (Sept. 30).

## D. PUBLIC AFFAIRS

The MTF Public Affairs Office activity increased during 1965 as is reflected in the following chart. The chart graphically portrays the increase throughout the year of responsibilities of the Public Affairs Office.

# 1965

## YEAR END REPORT

| | JAN. | FEB. | MAR. | APR. | MAY | JUNE | JULY | AUG. | SEP. | OCT. | NOV. | DEC. | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Speeches | 7 | 4 | 4 | 12 | 5 | 1 | 5 | 5 | 1 | 6 | 10 | 2 | 62 |
| News Releases | 2 | 3 | 10 | 1 | 4 | 3 | 6 | 2 | 2 | 4 | 4 | 4 | 45 |
| Photo Releases | 3 | 11 | 16 | 1 | 14 | 10 | 2 | 4 | 6 | 9 | 11 | 12 | 99 |
| Press Visitors | 7 | 11 | 12 | 23 | 8 | 4 | 10 | 12 | 5 | 26 | 9 | 0 | 127 |
| Exhibits | 0 | 1 | 0 | 2 | 1 | 1 | 1 | 2 | 4 | 0 | 0 | 0 | 12 |
| Briefings/Tours | 16 | 22 | 25 | 38 | 43 | 71 | 107 | 60 | 30 | 53 | 60 | 43 | 568 |
| No. of People | 98 | 195 | 275 | 732 | 991 | 2178 | 1090 | 702 | 8093 | 484 | 243 | 1764 | 16,845 |
| Radio/TV Specials | 0 | 0 | 0 | 1 | 5 | 8 | 3 | 2 | 0 | 3 | 1 | 0 | 23 |
| Clearances | 7 | 0 | 6 | 8 | 4 | 9 | 10 | 9 | 6 | 7 | 10 | 10 | 86 |
| *Info Cntr Visitors | 526 | 584 | 639 | 822 | 774 | 674 | 1135 | 1951 | 819 | 574 | 536 | 2491 | 11,525 |
| Briefs/Speeches Written | 0 | 0 | 1 | 1 | 1 | 3 | 1 | 3 | 1 | 2 | 2 | 0 | 15 |
| Special Articles Written | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 4 |
| NASA Films Loaned | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 23 | 29 | 40 | 26 | 133 |

*This function was moved to the Central Control Building from the old Information Center on Highway 43 in July.

FIGURE 2

GAINESVILLE, Miss. -- The Central Control Building at dusk represents one of many modern structures that have been erected at the NASA Mississippi Test Facility in Hancock County. NASA's Public Information Office is contained here as well as an auditorium, visitors gallery, site-wide control unit and a 90-foot observation tower.

## CHAPTER III

## CONSTRUCTION CONTRACTS STATUS AND LAND ACQUISITION

### I. CONSTRUCTION CONTRACTS NOW IN PROGRESS:

As 1965 ended at MTF, the following contracts were in progress in the indicated areas.

#### A. TEST FACILITIES

1. The S-IC Test Stand, position B-I, awarded to Blount Brothers Corporation, 79 Commerce Street, Montgomery, Alabama, 3-2-65, $4,794,000.000.
2. S-II Test Complex, Test Position A-I, Koppers Co., Inc., Malan Construction Department, New York, New York, $8,080,183.00.
3. High Pressure Water and Heating Facility, Miller, Donovan & Power (joint venture), Fort Worth, Texas, $3,666,270.19.
4. S-IC Test Complex, Position B-2, Koppers Co., Inc., Malan Construction Department, New York, New York, $17,244,870.25.
5. S-II Vehicle Service & Vertical Checkout Building, and Barge Service Building, Chaney & James, Richardson, Texas, Approximately $4,795,000.00.
6. S-IC Test Stand Position B-I, Blount Brothers Construction Company, Montgomery, Alabama, Approximately $5,513,000.00.

#### B. SUPPORT FACILITIES AND UTILITIES:

1. Furnishing and installing equipment for Test Maintenance Building, Carpenter Brothers, 1335 Plowman, Dallas, Texas, 1-18-65, $371,000.00.
2. Administrative Area Sitework, Farrell Construction Co., Inc., 403 Cotton Exchange Building, Memphis, Tennessee, 2-23-65, $642,211.98.
3. Components Service Facility, Mike Bradford & Company, Inc., 9300 South Dixie Highway, Miami, Florida, 3-12-65, $3,232,236.85.
4. Guard Houses and Reception Buildings, Haddad Construction Company, 2248 Front Street, Slidell, Louisiana, 3-8-65, $327,832.50.
5. Site Improvement, McInnis Florist and Nursery, P.O. Box 305, Moss Point, Mississippi, 6-23-65 $39,088.00.

6. Filter Repair, Permanent Filter Corporation, Compton, California, 8-13-65, $6,183.00.
7. Spare Parts for Valves, ITT-Hammel Dahl Division, 7-21-65, $57,065.23.
8. Dewars, Liquid Nitrogen, Container Service, Inc., Lowell, Massachusetts, 7-27-65, $17,728.00.
9. Warehouse Addition and Sitework, Fullerton Construction Co., Sacramento, California, $1,707,105.00.
10. Road, parking areas, and scale, Thornton & Hyde Construction Co., Gulfport, Mississippi, $1,801,112.19.
11. Mobile Equipment Maintenance Building, Carpenter Brothers, Dallas, Texas, Approximately $1,387,000.00.
12. Administration Area Sitework, Farrell Construction Company, Memphis, Tennessee, Approximately $739,000.00.
13. Guard Houses and Reception Centers, Haddad Construction Company, Slidell, Louisiana, Approximately $362,000.00.
14. Components Service Facility, Bradford Corporation, Miami, Florida, Approximately $3,370,000.00.

C. WATERWAYS AND DOCKING FACILITIES:

There are currently no waterways and docking facilities under construction.

## II. CONSTRUCTION CONTRACTS COMPLETED DURING 1965

### A. TEST FACILITIES:

1. Saturn Test Stand, B1-B2 substructure, Peter Kiewit Sons' Company & C. H. Leavell & Company (joint venture), 1900 Wyoming Avenue, El Paso, Texas, 2-12-64, $3,777,109.67, 6-21-65.
2. High Pressure Gas Facility, Hardeman Construction Co., Stanton, California, $1,418,296.94.
3. Saturn Second Stage (S-II) Test Facilities, C. H. Leavell & Peter Kiewit, El Paso, Texas, $18,164,856.14.
4. Test Well and Well No. 1, Layne Central Company, Jackson, Mississippi, $74,065.01.
5. Clearing Saturn V Complex, L. S. Stockstill, Baton Rouge, Louisiana, $88,310.31.
6. Pile Test A-I Test Stand S-II Complex, Fairchild & Snowden, Hattiesburg, Mississippi, $9,885.00.

7. Industrial Water Well No. 2, Carloss Well Supply Company, $81,964.00.
8. Saturn Test Stand A-I Foundation, Leavell-Kiewet, $1,217,533.50.
9. S-IC and S-II Test Stands Excavation, Greenhut Construction Company, Pensacola, Florida, Approximately $3,189,000.00.

B. SUPPORT FACILITIES AND UTILITIES:

1. Roads, Railroads, and Utilities, Thornton Construction Company, Inc. & Hancock, Michigan & Hyde Construction Corporation, Jackson, Mississippi, (joint venture), 2-18-64, $1,357,369.60, 1-22-65.
2. Bascule Bridge, Warrior Constructors, Inc., P. O. Box 127, Houston, Texas, 8-15-63, $1,313,638.92, 3-15-65.
3. Data Acquisition Facility, C. H. Leavell & Company, and Peter Kiewit Sons' Company (joint venture), 1900 Wyoming Avenue, El Paso, Texas, 12-2-63, $986,949.75, 3-31-65.
4. Sitework, Thornton Construction Co., Inc., and Hyde Construction Corporation (joint venture), P. O. Box 2416, Evergreen Station, Gulfport, Mississippi, 7-2-64, $754,067.52, 5-7-65.
5. Roads A, H, K, and L, Western Materials Company, Shawnee, Oklahoma, 6-16-64, $1,709,122.94, 6-10-65.
6. Central Control Building and Data Handling Center, C. H. Leavell & Co., and Peter Kiewit Sons' Co., (joint venture), 1900 Wyoming Ave., El Paso, Texas, 12-10-63, $1,464,178.00, 7-2-65.
7. Site Improvement, McInnis Florist & Nursery, Moss Point, Mississippi, Approximately $45,000.00.
8. Electronics, Instrumentation, & Materials Laboratory, Fuller & Warrior, Dallas, Texas, $2,120,345.20.
9. Propellant Facilities, Broadway & Glantz, Long Island City, New York, $5,102,571.90.
10. Test Maintenance Building, Carpenter Brothers, Dallas, Texas, $1,385,889.38.
11. Inflammable Material and Welding Tank Storage Building, Carpenter Brothers, Dallas, Texas, $258,096.59.
12. Sonic Measuring Facility, Carpenter Brothers, Dallas, Texas, $672,117.95.
13. Mobile Equipment Maintenance Building, Carpenter Brothers, Dallas, Texas, $1,429,600.00.
14. Laboratory & Engineering Building, Warrior Construction, Inc., Houston, Texas, Approximately $3,769,000.00.

15. Temporary Acoustical Facility, Linden Construction Co., Silverhill, Alabama, $28,664.04.
16. Area Engineer Office & Laboratory, F. B. Bear Construction Company, Pensacola, Florida, $99,950.45.
17. Perimeter Fencing, Tanner Heavy Equipment Co., Waynesboro, Mississippi, $37,734.70.
18. Unloading Steel Sheet Piling, Fairchild & Snowden, Hattiesburg, Mississippi, $8,000.00.
19. Two potable water wells, Carloss Well Supply Company, Memphis, Tennessee, $79,547.00.
20. Railroad & Classification Yard, William A. Smith, Construction Company, $350,844.55.
21. Emergency Service Building, C&B Construction Company, $295,683.16.
22. Warehouse Site Maintenance Building, Carpenter Brothers, Dallas, Texas, $2,144,039.60.
23. Telephone Building, F. B. Bear Construction Co., Pensacola, Florida, $402,640.10.
24. Central Heating Plant, General Piping, Inc., $1,461,842.89.
25. Miscellaneous Utilities (A), U. S. Paving Co., $163,489.25.
26. Industrial Water Well No. 1, Layne Central Company, Jackson, Mississippi, Approximately $60,000.00.
27. Electrical Systems & Substation, Baroeo Electric Company, Pensacola, Florida, Approximately $238,000.00.
28. River Navigation Aids, U. S. Coast Guard, Approximately $70,000.00
29. Miscellaneous Utilities (B and C), Thornton & Hyde Construction Company, $24,511.00.

C. WATERWAYS AND DOCKING FACILITIES:

Contracts awarded and completed for waterways and docking facilities at MTF include:

1. Rolling Mooring Devices and Mooring Piers for Cryogenic Dock and Access Canal, Chaney & James Construction Co. Inc., P.O. Box 510, Richardson, Texas, 4-21-64, $360,510.00, 1-21-65.
2. Main Canal, Farrell Construction Co., Inc., 403 Cotton Exchange Building, Memphis, Tennessee, 2-11-64, $2,435,721.60, 5-15-65.
3. Navigation Lock & Lock Water Supply, Morrison-Knudsen Company, Inc., 8610 Atlantic Avenue, South Gate, California, 1-21-64, $7,741,066.97, 6-23-65.

4. Snagging & Clearing Banks East Pearl River, U. S. Army Corps of Engineers, Mobile, Alabama, $15,000.00.
5. Dredging East Pearl River, T. L. James Company, Ruston, Louisiana, $123,720.00.
6. Construction Dock, Harders Construction Company, Panama City, Florida, $364.337.78.
7. Excavation and Dewatering for Lock and Bridges, American Dewatering Corporation, Rockaway, New Jersey, $731,620.05.
8. Harbor Dredging, T. L. James Company, Ruston, Louisiana, $677,529.78.
9. Cryogenic Docks, Farrell Construction Co., $1,295,346.38.
10. Dredging East Pearl River & Lock Approach Channel, Sabine Dredging & Contracting Company, Inc., $491,814.79.

## III. LAND ACQUISITION

Land Acquisition was completed at MTF during 1965 and total funds allotted for this project was $18,273,489.01. This included purchase of 161 tracts and 13,424 acres in the fee area; 3,208 tracts and 125,344 acres in the buffer zone, for a total of 3,369 tracts and 138,768 acres.

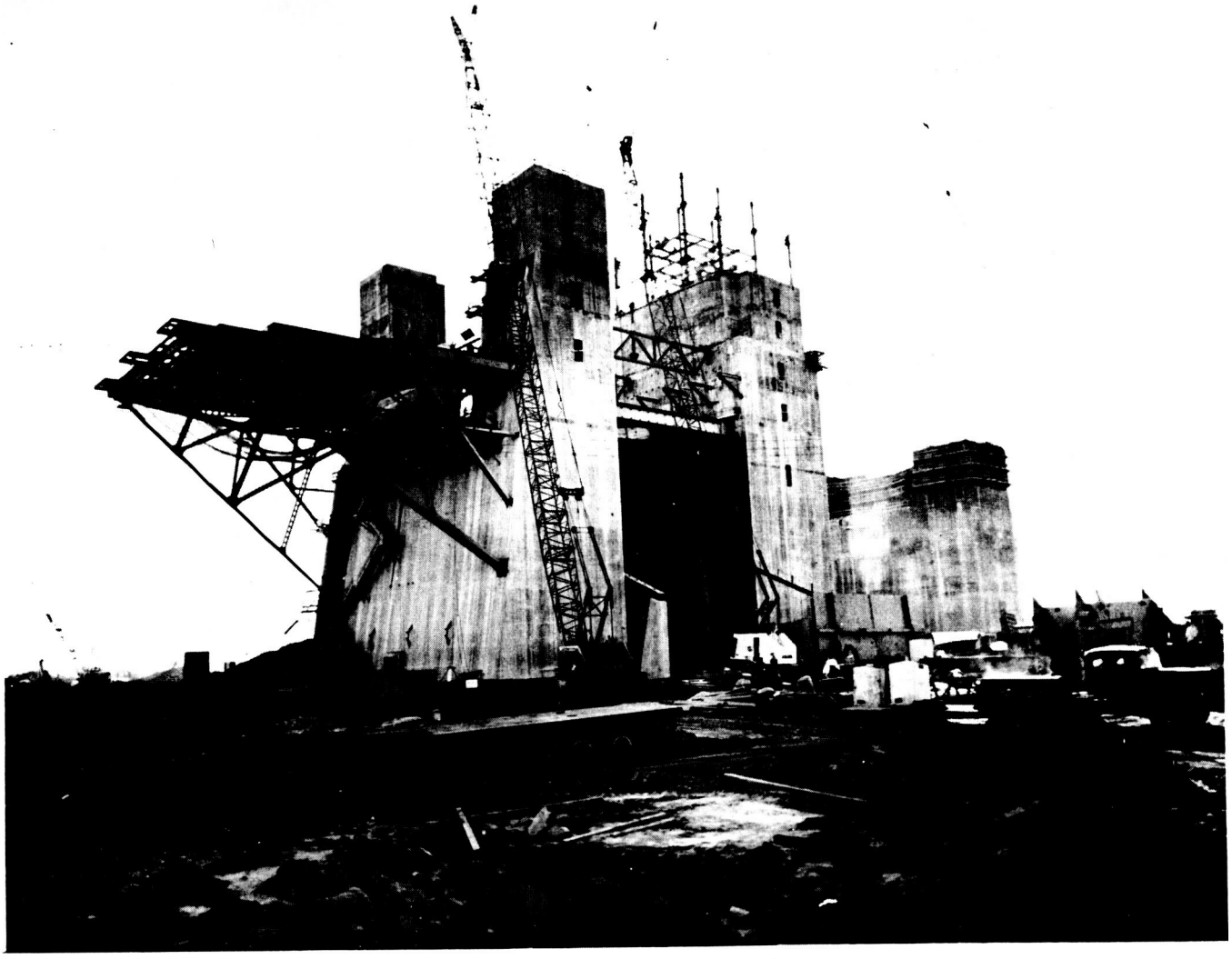


FIGURE 3

GAINESVILLE, Miss. -- The S-IC dual test stand began to take shape during 1965 at the National Aeronautics and Space Administration's Mississippi Test Facility. The stand will tower 407 feet into the air from its base to the top of the overhead crane. It is reported to be the tallest structure in the state of Mississippi.

# CHAPTER IV

# TECHNICAL SYSTEMS

## A. PHASE I

On July 3, 1963, Phase I of the technical systems was awarded to Aetron Division, Aerojet General Corporation. As of December 31, 1965 the contract was approximately 99% complete. All buy items, specifications under this contract, have been approved and released for procurement action, and all purchase orders have been awarded. At year's end, Aetron employed 42 persons at the test site.

Specifically, Phase 1 consists of the design, procurement, and installation of the Instrumentation and Control Systems for the first S-II Test Stand (A-2), the DAF, DHC, Central Control Building, and the Preliminary Design of the S-IC Instrumentation and Control Systems.

## B. PHASE II

The General Electric Company was awarded a contract for the Phase II and Phase III Technical Systems under contract NASw-410, MSFC-1. Phase II consists of the installation of activation and support equipment (controls and instrumentation) for the S-IC test stand, the S-II (A-1) test stand, and the two test control centers. The contract has been amended by amendments 15, 21, 27, 34, 36, and 52. These amendments reflect the major changes in the basic 410 contract.

## C. PHASE III

Phase III is composed of the following test support facilities: The Electronics, Instrumentation, and Materials Laboratory (E,I,&M), the Sonics Measuring Facility, (SMF), the Components Service Facility, (CSF), (pre-design and technical systems), the Field Activation Instrumentation Units, (FAIU), and the Mobile Instrumentation Units, (MIU). As of December 31, 1965, the MIUs, FAIUs, and the pre-design work for the CSF were complete. The EI&M Laboratory was about 96% complete, while approximately 29% of the Sonics Measuring Facility was complete.

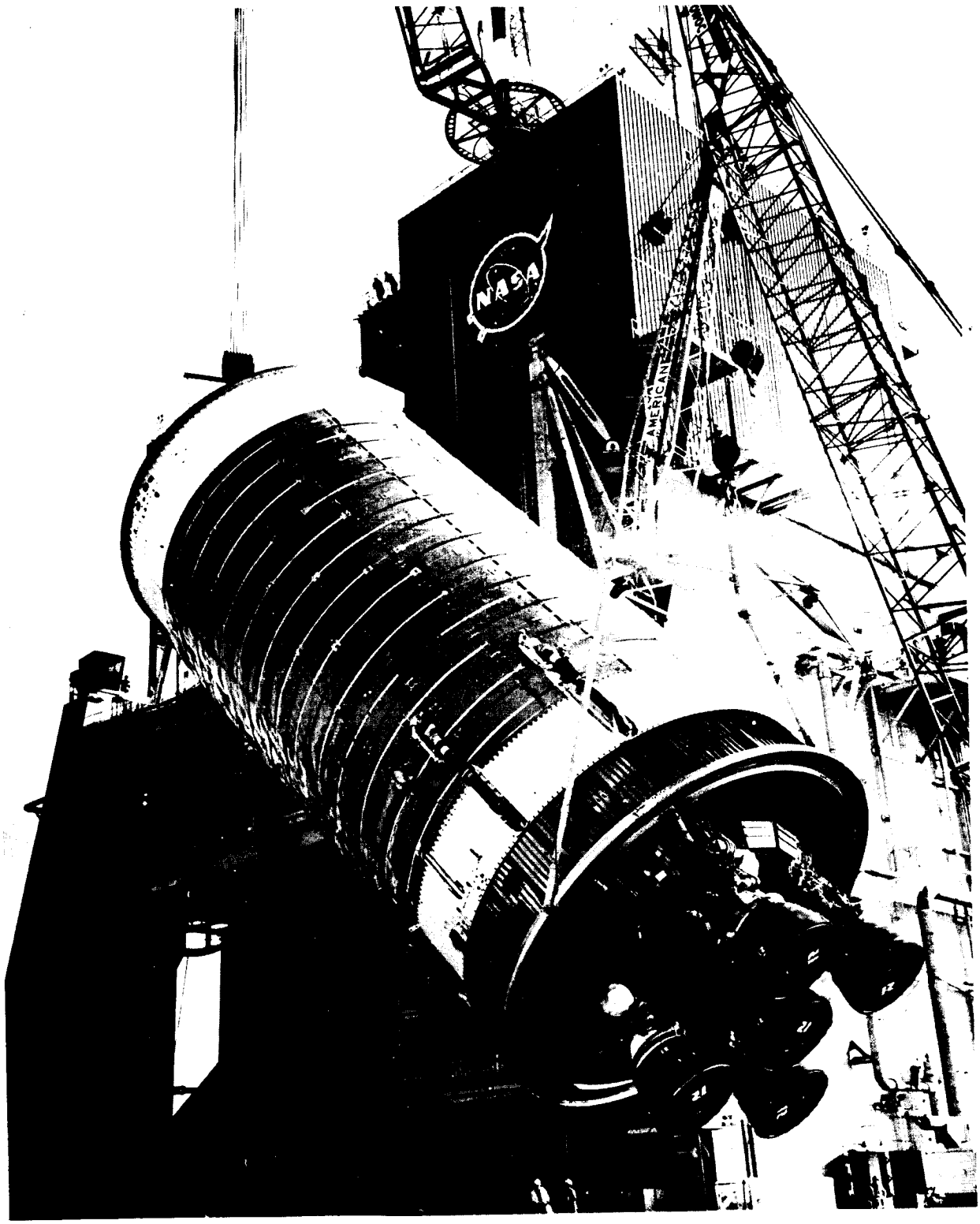



FIGURE 4

GAINESVILLE, Miss. -- Huge cranes swing the S-II-T, all-systems test model of the second stage of the Saturn V Apollo space vehicle, into its test stand at NASA's Mississippi Test Facility in Hancock County, Mississippi. The S-II stage of the Saturn V is 81 feet long and 33 feet in diameter.

FIGURE 5

The S-II-T, all-systems test model of the second stage of the Saturn V Apollo, sits in the S-II (A-2) test stand at the NASA Mississippi Test Facility. The S-II is the largest liquid hydrogen rocket in the world.

# CHAPTER V

## SUPPORT SERVICES

Space for personnel continued to be a critical problem at MTF during 1965. Many of the permanent buildings and facilities were completed and occupied, but pressing need for more space to house the large numbers of personnel attached to the MTF activation team was evident. A temporary measure to cope with this problem was the purchase and leasing of more than 50 trailers. The trailers were located at various strategic areas of the site.

Support services contracts, which were completed during the year, totaled 10, most important of which were the Bascule Bridge, Lock and Canal Complex, and associated contracts. The arrival of the tugboat Clermont was a major milestone in the history of MTF and marine transportation. The Clermont is the world's first turbine powered tugboat, and was turned over to NASA-MTF in October.

Thirty-three miles of railroad were completed during the year and many of the highways linking the complexes were finished.

Ten support services contracts were let during 1965 at MTF. They are:

Airways Rent-a-car, let 1-1-65, leased vehicles; Harrison Detectives, 3-3-65, security guards; Bird Fire & Safety, 10-1-65, Fire Protection; Space Services, 9-1-65, Plant Maintenance; James Travirca, 11-1-65, grounds maintenance; East Coast Flying Service, 7-1-65, aircraft charter; Cook Brothers, 2-1-65, Motor Vehicle personnel; National Mobile Leases, 4-20-65, trailers; M&T Company, 2-15-65, mechanical utilities, and Airways Rent-a-car, 9-30-65, leased buses.

FIGURE 6

GAINESVILLE, Miss. -- A look at the National Aeronautics and Space Administration's sprawling Mississippi Test Facility from the air shows the lock, bascule bridge and a portion of the seven and one half mile man-made canal system. The canals lead up to the very base of the test stands where rocket stages are placed to undergo static firing. MTF covers 13,500 acres of land in Hancock County, Mississippi and is valued at $260 million.

# CHAPTER VI

## NEWS RELEASES

On the following pages are articles and news stories released by the Public Affairs Office, Mississippi Test Facility, during the period from January 1, 1965, through December 31, 1965.

PUBLIC AFFAIRS OFFICE
MISSISSIPPI TEST OPERATIONS
GEORGE C. MARSHALL SPACE FLIGHT CENTER
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
BAY ST. LOUIS, MISSISSIPPI

PHONE: 467-7511, Extension 216
(Joel T. Meriwether Pass Christian 452-4067)

FOR RELEASE:
January 5, 1965

GAINESVILLE, MISS. -- Bids for the construction of two service buildings at NASA's Mississippi Test Operations are being called for in advertisements being released today. The two buildings will be the vehicle storage and checkout building for the S-II stage of the Saturn V rocket, and the service building for cryogenic barges.

Mississippi Test Operations is being established in Hancock County to static test the S-IC and S-II stages of the Saturn V moon rocket. The U. S. Army Corps of Engineers, Mobile District, construction agent for NASA at the facility, released the advertisements for bids for the two new buildings. Bids will be opened on February 2 in Mobile.

The S-II storage and checkout building will be used to receive and store the stages, prepare and check them out prior to test firing, perform minor rework, and repackage them for shipment to Cape Kennedy. The building will be, in reality, two buildings joined together. There will be a horizontal storage area and a smaller maintenance area, and there will also be a 126-foot-high vertical checkout bay.

The cryogenic barge service building will serve as the base of operations and protective maintenance shop for the fleet of liquid oxygen and liquid hydrogen barges serving MTO.

Cost of the contract is estimated at more than $3 million.

# # # # #

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
BAY ST. LOUIS, MISSISSIPPI

PHONE: 467-7511, ext. 216

FOR RELEASE:
January 18, 1965

GAINESVILLE, Miss. -- Bids on the construction of a second test position on the dual-position first stage test stand at the National Aeronautics and Space Administration's Mississippi Test Operations will be opened on March 1.

An advertisement calling for the bids has been issued by the U. S. Army Corps of Engineers, Mobile District, construction agent for NASA at the Mississippi Test Facility.

The work will include erection of a structural steel tower about 106 feet high on the west pier which will be built under a separate contract. The new contract will also include a flame deflector, platform, piping systems, utilities, a steel instrumentation tower, concrete observation bunker, and concrete pads and walks. Estimated cost of the contract is in excess of $3 million.

The substructure for the double S-IC stand is under construction now by the joint venture of Leavell-Kiewit. The superstructure base piers and first position will be built by the Malan Construction Department of Koppers Company, Inc.

Mississippi Test Operations, a division of the Marshall Space Flight Center, Huntsville, Ala., is being established to static test the first and second stages of the Saturn V moon rocket.

# # # # #

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
BAY ST. LOUIS, MISSISSIPPI

PHONE: 467-7511, ext. 216

FOR RELEASE:
January 19, 1965

GAINESVILLE, Miss. -- About 100 employees of the National Aeronautics and Space Administration and the General Electric Company have begun moving into the new Office and Administration Building at NASA's Mississippi Test Operations this week.

The move heralds the opening of the test facility's first permanent office building. Only the north and south wings on the first floor of the three-story building are ready for occupancy this week, with the remainder to be completed during the next two months. The building will ultimately quarter some 750 persons.

NASA personnel moving into the building include William C. Fortune, Manager of MTO, and his office staff. Other NASA elements moving into new spaces are the Plant Operations Division and Resources Management Division. These people, numbering about 25, will be located in the north wing of the building.

The south wing will be occupied by General Electric personnel, including William R. Eaton, General Manager of Mississippi Test Support Operation, and his staff. Others include all or part of Plant Services, Office Services, Material and Logistics, Contract Operations, Finance, Communications and Laboratories, and the Technical Library. About 70 persons will be involved in the GE portion of the move.

Prime contractor of the 142,000 square foot building is Warrior Constructors, Inc., of Houston, Tex.

Mississippi Test Operations is being established in Hancock County to static test the first two stages of the Saturn V moon rocket. Testing operations will begin in early 1966.

# # # # #

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GEORGE C. MARSHALL SPACE FLIGHT CENTER
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BAY ST. LOUIS, MISSISSIPPI

PHONE: 467-7511, ext. 216

FOR RELEASE:
January 20, 1965

GAINESVILLE, Miss. -- The first regular meeting of the new year of the Mississippi-Louisiana Regional Planning Commission will be held on January 26, in Slidell, Louisiana. The meeting will be highlighted by the introduction of officers who will serve during 1965.

The Mississippi-Louisiana Regional Planning Commission, organized in February 1964, is an advisory body composed of representatives from the four county/parish area which forms the impact area of the National Aeronautics and Space Administration's Mississippi Test Operations. The members represent Hancock, Harrison and Pearl River Counties, Mississippi, and St. Tammany Parish, Louisiana.

Joseph V. Colson, Waveland, 1964 Regional Planning Commission President, will open the meeting, which will convene at Bosco's Restaurant in Slidell, at 6 P. M. The meeting is open to the public.

Milton B. E. Hill, Gulfport, Chairman for 1965, will take charge of the meeting and introduce his fellow officers: Edwin H. Randle, Slidell, First Vice Chairman; Buddy S. Broadway, Picayune, Second Vice Chairman; Robert D. Ladner, Picayune, Secretary; and Roy Baxter, Jr., Pearlington, Treasurer. Hill will address the gathering and then will introduce E. Robert Daley, Manager of the Planning Department, Mississippi A & I Board, who will also speak briefly to the group.

# # # # #

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MISSISSIPPI TEST OPERATIONS
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
BAY ST. LOUIS, MISSISSIPPI

PHONE: 467-7511, Extension 216
(Joel T. Meriwether Pass Christian 452-4067)

FOR RELEASE:
February 8, 1965

GAINESVILLE, Miss. -- Chaney and James Construction Company, Incorporated, of Richardson, Texas, has been awarded a contract for $4,353,000, at the National Aeronautics and Space Administration's Mississippi Test Operations, for the construction of a stage storage and checkout building for the S-II stage of the Saturn V moon rocket.

The contract was awarded today by the Army Corps of Engineers, Mobile District, construction agent for NASA at the Mississippi site. MTO is being established in Hancock County to static test the first two stages of the Saturn V rocket.

In addition to the S-II building, the contract calls for the construction of a service building for cryogenic barges at the facility. The S-II storage and checkout building will be used to receive and store the stages, prepare and check them out prior to test firing, perform minor rework, and repackage them for shipment to Cape Kennedy. The barge service building will serve as the base of operations and maintenance shop for the fleet of liquid oxygen and liquid hydrogen barges serving MTO.

This is the third contract awarded to Chaney and James for work at MTO. The firm is currently at work on the S-IC stage storage building and RP-1 dock under a $3.8 million contract awarded a year ago. The company is also constructing mooring devices under another contract.

# # # # #

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BAY ST. LOUIS, MISSISSIPPI

PHONE: 467-7511, Extension 216

FOR RELEASE:
February 19, 1965

GAINESVILLE, Miss. -- W. F. Parker, Vice President of North American Aviation's Space and Information Systems Division and Manager of the S-II Program, will make an orientation visit to the National Aeronautics and Space Administration's Mississippi Test Operations today.

Parker will receive a briefing on the status of construction and activation of facilities for the second stage of the Saturn V moon rocket. North American Aviation is the stage contractor of the S-II which will be static tested at MTO. Parker, who arrived last night from Downey, California, is accompanied by A. C. Martin, Director of S-II Test and Operations for North American.

The two visitors will meet today with William C. Fortune, Manager of MTO, and H. C. Cox, Manager of North American's activities here. They will spend the day in meetings with various NASA and North American personnel in a review of local progress.

# # # # #

FOR RELEASE:
March 2, 1965

GAINESVILLE, Miss. -- A contract for the construction of the second test position in the dual-position S-IC test stand at the National Aeronautics and Space Administration's Mississippi Test Operations was awarded today to Blount Brothers Corporation, Montgomery, Alabama, for $4,794,000.

The work will include construction of a structural steel tower 106 feet high on an existing concrete pier; a flame deflector, platform, piping systems, and utilities; and the construction of a steel instrumentation tower, concrete observation bunker, discharge flume, and concrete pads and walks.

The substructure, concrete piers and first test position are being built under separate contracts awarded previously to other firms.

Today's contract was awarded by the U. S. Army Corps of Engineers, Mobile District, construction agent for NASA.

Mississippi Test Operations, a division of NASA's Marshall Space Flight Center, Huntsville, Alabama, is being established in Hancock County to static test the first two stages of the Saturn V moon rocket. Operations are expected to begin in early 1966.

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(Joel T. Meriwether Pass Christian 452-4067)

FOR RELEASE:
March 8, 1965

GAINESVILLE, Miss. -- A contract for the construction of guard houses and reception buildings at the two main entrances of the National Aeronautics and Space Administration's Mississippi Test Operations was awarded today to the Haddad Construction Corporation, Slidell, Louisiana, for $327,832.

The north and south entrances to the facility will be on State Highway 43, between Bay St. Louis, and Picayune, Mississippi.

The contract was awarded by the U. S. Army Corps of Engineers, Mobile District, today. The Corps serves as NASA's agent for land acquisition, engineering design and construction on the MTO project.

The guard houses will each consist of a 50-square-foot guard room under a 960-square-foot steel roof deck.

The south reception building, which will be the main reception center where all identification badges will be made and issued, will contain 5,600 square feet. The north reception building, which will be used to receive visitors from the north and to issue temporary passes only, will contain 2,900 square feet.

Mississippi Test Operations, a division of the Marshall Space Flight Center, Huntsville, Alabama, is being established in Hancock County to ground test the first two stages of the Saturn V moon rocket.

# # # # #

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BAY ST. LOUIS, MISSISSIPPI

PHONE: 467-7511, Extension 216
(Joel T. Meriwether Pass Christian 452-4067)

FOR RELEASE:
March 9. 1965

GAINESVILLE, Miss. -- Fans of the National Aeronautics and Space Administration's Mississippi Test Operations are found in many states and many foreign countries, but all have a common interest in learning more about the static test facility being established here.

While their interest is common, the address they use for Mississippi Test Operations is not. Most letters are sent properly to Bay St. Louis, Mississippi. Many others are sent to Gainesville, which no longer has a post office; to Logtown, whose residents also have been relocated; to Hancock County; to South Mississippi; Louisiana; and similar geographical guesses.

If there is a classic, though, it arrived this week. A Space Age enthusiast from The Netherlands addressed his query to: Mississippi Test Operations, "East of the Pearl River and Forty Miles from Michoud, Louisiana, U.S.A."

The Post Office Department delivered.

# # # # #

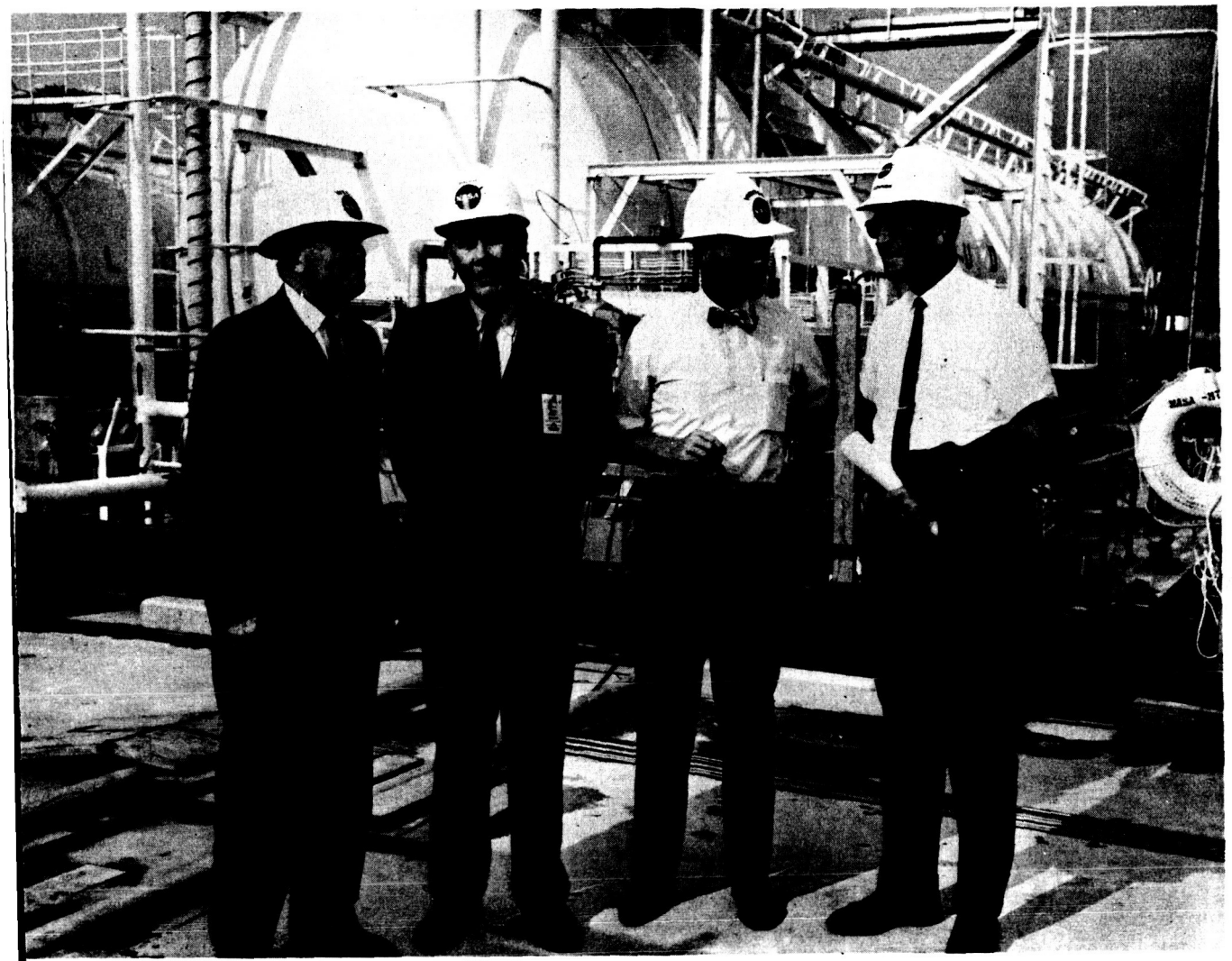

FIGURE 7

Mr. James E. Webb, NASA Administrator, and a number of top scientists and NASA consultants, including Astronaut John Glenn, visited the Mississippi Test Facility last week. Shown above are (left to right) Mr. Webb; MTF Manager Jackson M. Balch; Astronaut Glenn; and Gen. Edmund O'Connor, Director of MSFC's Industrial Operations. The group was briefed on the status of the rocket testing facility now in its final stage of development in Hancock County, Mississippi. They traveled from MTF to Cape Kennedy to observe the launch of the Gemini-Titan 5. Others in the group included Dr. Arthur Raymond. Rand Corporation and Consultant to NASA; General Charles P. Cabell, USAF (Ret.) NASA Management Consultant; Dr. C. Stark Draper, Head of Aeronautics and Astronautics Department, MIT and NASA Consultant; Mr. Gifford Johnson, NASA Consultant, President, Graduate Research Center of South West at Dallas; General James McCormack, Vice President, MIT; Mr. John C. Young, Deputy Associate Administrator for Administration, NASA Headquarters; Mr. Brian Duff, Public Affairs, NASA Headquarters; Mr. Harry Gorman, Deputy Director, Administration, MSFC; and Mr. Bart J. Slattery, Jr., Chief, Public Affairs, MSFC.

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(Joel T. Meriwether Pass Christian 452-4067)

FOR RELEASE:
March 9, 1965

GAINESVILLE, Miss. -- The NASA Marshall Space Flight Center's Industrial Operations has awarded a $1,059,000 contract to Aetron, a division of Aerojet General Corporation, for installation of equipment on a Saturn V second stage test stand at Mississippi Test Operations.

Aetron will install government supplied ground support equipment on one of the S-II acceptance test stands at MTO. The work will also include installing equipment in the area's test control center.

Equipment will include console checkout systems on the flight stages being tested as well as control equipment.

North American Aviation, S-II development contractor, will test the S-II flight stage at the Mississippi Test Operations. This stage, second stage of the Saturn V moon rocket, will have five J-2 engines which will give the stage a total thrust of one million pounds. (The first and third stages will have 7.5 million and 200,000 pounds thrust respectively.)

Aetron is expected to complete the equipment installation in September.

The firm also holds a contract totaling some $19 million for providing instrumentation and control systems for the S-II test stand, control center and other MTO facilities.

# # # # #

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PHONE: 467-7511, Extension 216
(Joel T. Meriwether Pass Christian 452-4067)

FOR RELEASE:
March 16, 1965

GAINESVILLE, Miss. -- For the first time since construction started at the National Aeronautics and Space Administration's Mississippi Test Operations two years ago, the number of employees associated with the facility has passed 3,000.

The population report for this week shows a total of 3,006 persons engaged in work associated with the establishment of MTO. This is an increase of 365 over the previous week's report which totaled 2,641.

A breakdown shows NASA with 46 employees; General Electric Company, 412; G.E. subcontractors, 178; U.S. Army Corps of Engineers, 164; Corps Land Acquisition Office, Bay St. Louis, 8; U. S. Weather Bureau, 9; Hancock County Security Patrol, 9; The Boeing Company, 7; North American Aviation, Inc., 78; construction and installation workers, 2,095.

Mississippi Test Operations is being established in Hancock County to static test the first two stages of the Saturn V moon rocket.

# # # # #

PUBLIC AFFAIRS OFFICE
MISSISSIPPI TEST OPERATIONS
GEORGE C. MARSHALL SPACE FLIGHT CENTER
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
BAY ST. LOUIS, MISSISSIPPI

Statement issued at 12:00 Noon, March 17, 1965 on status of strike at MTO. Cleared by Paul Styles, NASA Labor Relations Officer and Fred Tyvoll, MTO Labor Relations Officer.

(FIRST STATEMENT)

At 10:00 A.M. today 547 construction workers were on strike at the National Aeronautics and Space Administration's Mississippi Test Operations in Hancock County. The number is growing by the hour.

The strike is widespread and affects work all over the $256 million facility under construction to test fire the first two stages of the Saturn V moon rocket which will be used in this nation's manned lunar landing program.

The strike began yesterday when some 195 pipefitters of the United Association of Plumbers, Steamfitters and Apprentices of the U. S. and Canada walked off the job. The strike has spread now to most building trades -- including carpenters, iron workers, painters, cement finishers and other crafts.

The strike is apparently over NASA contracting policies as the the application of the Davis-Bacon Act to support maintenance and operation contracts.

A tentative meeting of NASA labor officials and building trades officials has been set for 5:30 P.M. today in Gulfport. The local committee of the President's Missile Sites Labor Commission is standing by to consider this work stoppage.

# # # # #

PUBLIC AFFAIRS OFFICE
MISSISSIPPI TEST OPERATIONS
GEORGE C. MARSHALL SPACE FLIGHT CENTER
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
BAY ST. LOUIS, MISSISSIPPI

Statement issued at 12:00 noon, March 18, 1965, on status of strike at MTO. This statement was cleared by Paul Styles, NASA Labor Relations Director, and Bart J. Slattery, Chief, Public Affairs Office, Marshall Space Flight Center, Huntsville, Alabama.

(SECOND STATEMENT)

Paul Styles, Director of Labor Relations for the National Aeronautics and Space Administration, issued this statement concerning the work stoppage at NASA's Mississippi Test Operations after meeting with union officials of the Building Trades Union at Gulfport, Mississippi.

"Mr. Harry Gorman, Deputy Director of the Marshall Space Flight Center, officials of the Federal Mediation and Conciliation Service, and myself urged the union officials to return their people to work and take their problem to the President's Missile Sites Labor Commission.

"I have also requested the U. S. Army Corps of Engineers, NASA's agent for construction at MTO, to ask their contractors to man their jobs.

"Mr. Dick Taylor, Chairman of the local committee of the Missile Sites Labor Commission, has notified the union officials to meet at 2:00 p.m. today at the Corps of Engineers Area Office at MTO to show cause why they should not man their jobs.

"This work stoppage is a repudiation of the Project Stabilization Agreement signed by the unions and contractors in 1963.

"This strike has virtually stopped construction at MTO. Portions of this $256 million NASA facility are pacing items in this nation's manned lunar landing program. For instance, facilities under construction to test fire the S-II rocket -- the second stage of the Saturn V Apollo moon rocket -- are the only facilities under way in this country to test this stage.

"This walk-out is costing the American taxpayers millions of dollars a day.

"As to the cause of the strike, union officials contend that contracts let by the General Electric Company in behalf of NASA for cleaning of rocket propellant systems, should be covered by the Davis-Bacon Act. The contract in contention was let by competitive bid to Consolidated American Services of Hawthorne, California. I have been informed that CONAM has a collective bargaining agreement with the International Union of Operating Engineers. The company presently has three Operating Engineers employed.

"The United Association of Plumbers, Steamfitters, and Apprentices of the United States and Canada takes the position that this work being done by CONAM should be covered by the Davis-Bacon Act or the General Presidents' Maintenance Agreement of the Building and Construction Trades Department, AFL-CIO.

"They also take the position that certain instrumentation work now under contract to the Boeing Company and North American Aviation, Incorporated, should be covered under Davis-Bacon or the General Presidents' Maintenance Agreement."

Work at MTO was virtually at a standstill today with an estimated 800 construction workers out at 10:00 a.m. Before the strike, there were about 2,000 construction-installation workers at the site.

MTO, a division of the Marshall Space Flight Center, Huntsville, Alabama, is under construction to test fire the first two stages of the Saturn V Apollo moon rocket which will be used in this nation's manned lunar landing program.

# # # # #

Statement issued at 6:00 p.m., March 18, 1965, on status of strike at MTO. This statement was cleared by Paul Styles, NASA Labor Relations Director, and Bart J. Slattery, Jr., Chief, Public Affairs Office, Marshall Space Flight Center, Huntsville, Alabama.

(THIRD STATEMENT)

Paul Styles, Director of Labor Relations for the National Aeronautics and Space Administration, issued this statement concerning the work stoppage at Mississippi Test Operations following a meeting of the President's Missile Sites Labor Commission at the Corps of Engineers Area Office at MTO.

"We met with representatives of the Gulf Coast Building and Construction Trades Council at the site this afternoon. We feel that considerable progress was made at this session and we are optimistic that most of the workers will return to their jobs tomorrow."

PUBLIC AFFAIRS OFFICE (FOURTH STATEMENT)
MISSISSIPPI TEST OPERATIONS
GEORGE C. MARSHALL SPACE FLIGHT CENTER
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
BAY ST. LOUIS, MISSISSIPPI

Statement issued at 10:00 a.m., March 19, 1965, on status of strike at MTO. This statement was cleared by Paul Styles, NASA Labor Relations Director. Mr. Bart J. Slattery, Jr., Chief, Public Affairs Office, Marshall Space Flight Center, Huntsville, Alabama, was informed.

Labor officials of the National Aeronautics and Space Administration, U.S. Army Corps of Engineers, Federal Mediation and Conciliation Service and union representatives are continuing discussions today on the work stoppage at NASA's Mississippi Test Operations.

About 800 construction workers did not man their jobs at the rocket test site today.

Paul Styles, Director of Labor Relations for NASA, said he was "optimistic" about the outcome of the talks now going on and felt an agreement would be reached.

# # # # #

Statement issued at 3:00 p.m., March 19, 1965, on status of strike at MTO. This statement was cleared by Paul Styles, NASA Labor Relations Director, and Bart J. Slattery, Jr., Chief, Public Affairs Office, Marshall Space Flight Center, Huntsville, Alabama.

(FIFTH AND FINAL STATEMENT)

Paul Styles, Director of Labor Relations for the National Aeronautics and Space Administration, issued this statement following a meeting today with other government labor officials and representatives of the unions involved:

"The work stoppage at the National Aeronautics and Space Administration's Mississippi Test Operations has ended. The matters in contention were resolved to the mutual satisfaction of all parties. Workers are returning to their jobs this afternoon. The normal complement of personnel required for Saturday work is expected. All construction workers are expected to be on hand Monday morning to man their jobs."

PUBLIC AFFAIRS OFFICE
MISSISSIPPI TEST OPERATIONS
GEORGE C. MARSHALL SPACE FLIGHT CENTER
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
BAY ST. LOUIS, MISSISSIPPI

PHONE: 467-7511, Extension 216

FOR RELEASE:
April 8, 1965

GAINESVILLE, Miss. -- Activity at the National Aeronautics and Space Administration's Mississippi Test Operations has increased during the past several weeks to the extent that it is bringing noticeable changes to the facility and the surrounding area.

Construction contracts worth more than $100 million are now in effect at the static test facility being established in Hancock County. These contracts involve 30 projects in various stages of construction at the site. About 20 local and national construction contractors hold the prime contracts for these projects, with subcontracts involving some 200 to 300 other companies. More than 2,000 construction and installation workers are employed at the facility.

In addition to the $100 million in projects now under way, 29 construction contracts worth more than $15 million have been completed since building started at MTO almost two years ago. Most recent project to be completed is the bascule bridge which crosses the main canal. The bridge was turned over to NASA during the latter part of March.

Work on the activation of test stands and support facilities is an increasingly important role at MTO for NASA and contractor personnel. As actual construction of the various projects is completed, the activation effort takes over to make the facility operational in all aspects.

Buildup of permanent personnel at Mississippi Test Operations is showing a marked increase weekly, bringing new families to the surrounding communities. During the month of March, 152 employees, an average of almost 40 new families a week, were added to the roles of the stage and support contractors. These new personnel, added by General Electric Company, North American Aviation and The Boeing Company, bring the current total of permanent employees at MTO to almost 800.

The U.S. Army Corps of Engineers, Mobile District, has 164 engineers and support employees at the site, monitoring construction for NASA.

Mississippi Test Operations, a division of the Marshall Space Flight Center, Huntsville, Alabama, is being established in Hancock County to static test the first two stages of the Saturn V moon rocket. Construction of the facility is expected to cost more than $250 million. The first of three test stands is scheduled to be operational by the first of 1966. The facility will be fully operational at the beginning of 1967.

# # # # #

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FOR RELEASE:
April 21, 1965

GAINESVILLE, Miss. -- With the increase in activity at the National Aeronautics and Space Administration's Mississippi Test Operations, there is little time to pause and reflect on National Secretaries' Week now in progress.

However, supervisors at the facility, perhaps, will contemplate just for a moment the yeoman's job done by each of their Girl Fridays.

The secretary -- be her title stenographer, typist, clerk, receptionist or whatever -- is playing an increasingly important role at the test facility, just as she is in industry as a whole. With the necessity of keeping complete records of daily transactions, communicating by letter and telephone with others, etc., the secretary is becoming a professional in every sense of the word.

More than 200 women are employed by NASA, General Electric, North American, Boeing, the Corps of Engineers, and the construction contractors in various capacities at the facility.

National Secretaries' Week gives the boss an opportunity, as brief as it may be, to say to his secretary, "Thanks for a job well done."

# # # # #

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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PHONE: 467-7511, Extension 216

FOR RELEASE:
May 5, 1965

GAINESVILLE, Miss. -- A notable milestone was passed at the National Aeronautics and Space Administration's Mississippi Test Operations early this week when traffic was routed over the new canal bridge and Road "A" for the first time.

Automobiles traveling north on State Highway 43 will detour over Road "A" when they enter the facility. The well-marked road directs traffic back to Highway 43 north of the bridge. The new route allows construction to proceed on the main canal system at the static test facility being constructed in Hancock County.

Water is being pumped into the navigation lock at MTO and the levee between the harbor and the lock is expected to be removed in the near future. At present, the water level in the lock is about 15 feet. The lock is expected to be operational in June.

Mississippi Test Operations, a division of the Marshall Space Flight Center in Huntsville, Alabama, is being established to static test the first two stages of the Saturn V moon rocket. Construction agent for NASA is the U.S. Army Corps of Engineers, Mobile District.

# # # # #

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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PHONE: 467-7511, Extension 216
(Mack Herring Long Beach 863-0862)

FOR RELEASE:
May 6, 1965

GAINESVILLE, Miss. -- The National Aeronautics and Space Administration's Mississippi Test Facility, one of the most important links in the nation's manned lunar landing program, is now entering the final phase of preparation. The facility is to be ready for initial ground tests of Saturn V moon rocket stages beginning this winter.

MTF is being built, at an initial cost of $250 million, as a permanent national center for the ground testing of large space vehicle stages. It covers some 13,500 acres, surrounded by a buffer zone of about 128,000 acres. The site was selected in late 1961 and land acquisition and construction planning got underway in 1962.

First use of the facility will be for ground testing the first (S-IC) and second (S-II) stages of the Saturn V moon rocket, under development by the NASA-Marshall Space Flight Center and associated contractors. The early availability of the first S-II stand is especially important. The readiness of the MTF and specifically the first of two S-II test stands is considered to be one of the pacing items in the Apollo-Saturn program. While the immediate use of the facility is the testing of Saturn V stages, a built-in growth potential will make it an important part of the national space effort throughout the Saturn program and whatever may come after.

Because of the new phase of work being entered upon at the southwest Mississippi facility, and in order to assure the readiness of the installation late this year, MTF's parent organization, the NASA-Marshall Space Center, today announced two significant changes in the preparation of the installation:

1. The buildup in the number of persons working at the center will start immediately, somewhat earlier than originally predicted. This is the result of an overlapping of two functions: the completion of basic construction at the site and the initiation of special equipment installation, coupled with the arrival of the first element of the permanent operating staff.

2. A reshaping of the several elements of the Marshall Center which have been concerned with the planning, construction and general activation of the site. The interim organizations which have worked in these areas to date are being formed into a task force responsible for conclusion of construction and installation of special equipment and facilities necessary to activate the installation.

Details of these two moves follow.

The increase in the number of persons working at the site will result mainly from the movement into the area of a greater number of employees who will install equipment and operate the facility. These activation and operation employees are beginning their work before the completion of basic construction work which is being carried out by the Army Corps of Engineers.

Both classes of workers will be employed simultaneously at the site to this new degree as a result of a recent joint occupancy agreement reached between the Marshall Center and the Mobile District, Corps of Engineers, its construction agent. Approximate personnel projections are as follows:

As of April 30, 1965, there were 3,740 persons working at the site, made up of 1,130 activation and operation (A&O) personnel and 2,610 construction and installation (C&I) personnel.

By July 1, that number should reach 5,150, made up of 2,200 A&O and 2,950 C&I.

Most of the increase in the work this summer is associated with the completion of the first S-II test stand.

Originally it was expected that basic construction work would be essentially completed before "activation" crews started the installation of ground support equipment and other facilities which are necessary to the total readiness of this and other stands.

With the agreement of the Corps of Engineers, the two phases of work will be carried out concurrently for a short time instead of sequentially.

According to present employment projections, the total work population of MTO will reach a peak December 30, 1965, of 5,250 (3,300 A&O and 1,950 C&I).

Thereafter the construction and installation category of employees continues to drop, while the other category builds to a peak on December 30, 1966. At that time A&O will reach 3,700 and C&I will decrease to 120, giving the entire facility a total of 3,820.

By June 30, 1967, personnel totals should stabilize at about 3,165, all but 65 of whom will be A&O type personnel.

Most of the workers at MTO are and will continue to be employees of private companies. In the construction phase, dozens of firms are working under the supervision of the Corps of Engineers. The majority of the activation and operation type personnel will be employees of The Boeing Company and North American Aviation, Inc., prime contractors for the S-IC and S-II stages which will be tested at MTO and the General Electric Company, support

contractor, as well as subcontractors. NASA presently has 66 employees at MTO and at the peak will have only about 200. The Corps of Engineers also has a relatively small supervisory force.

As to the MSFC elements working on the Mississippi project, the present Mississippi Test Operations and the Activation Task Force have been formed into a new Mississippi Test Facility Task Force. Two temporary organizations located at Huntsville, which have been instrumental in the planning and early build-up of the facility, have been abolished, further emphasizing the new character of the work now beginning at MTF. They are the MTF Planning Board and the MTF Working Group. Some members of these two units will be assigned to the new Task Force.

Jackson Balch, until now MSFC's Assistant Deputy Director, Technical, has been assigned to Industrial Operations and will have dual titles of Mississippi Test Facility Site Manager and Head of the MTF Task Force.

William Fortune will continue as Manager of Mississippi Test Operations pending organizational arrangements necessary to carry out the increased scope of activation and operations.

Dr. Wernher von Braun, Director of MSFC, in making these changes pointed out that the Task Force is being formed for a special, limited job -- to complete construction and activation of the test site in a timely, efficient manner. A permanent NASA-MSFC organization which will supervise the continuing operation of MTF once it is activated will be formed later.

One effect of today's moves is to place complete responsibility for remaining MTF Activation work on the Marshall Center's Industrial Operations which is headed by Col. Edmund O'Connor. Colonel O'Connor's organization will continue to receive valuable support from the Center's Research and Development Operation, particularly in the form of the temporary assignments of key persons whose special skills are needed for the activation work.

# # # # #

PUBLIC AFFAIRS OFFICE
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
BAY ST. LOUIS, MISSISSIPPI

PHONE: 467-7511, Extension 216

FOR RELEASE:
May 19, 1965

GAINESVILLE, Miss. -- The NASA Marshall Space Flight Center's Mississippi Test Facility ended its second year of construction this week as the population passed the 4,000 mark.

Since mid-May, 1963, major construction has been under way here on facilities to static test the first two stages of the Saturn V moon rocket. Operations are expected to begin the first of 1966.

For the first time since the $250 million facility was started, the work population at the site has passed 4,000. As of May 15, employees numbered 4,161. Of this number, 2,636 were employed by construction and installation contractors. The U.S. Army Corps of Engineers, the Marshall Center's agent for construction at Mississippi Test Facility, had 176 employees stationed at the site.

Activation and operations people make up the other 1,349 employees at the facility: NASA, 59; General Electric Company, 823; General Electric subcontractors, 273; U.S. Weather Bureau, 8; The Boeing Company, 20; and North American Aviation, Incorporated, 166.

The Boeing Company and North American Aviation, Incorporated, are stage contractors on the first and second stages of the Saturn V moon rocket. General Electric Company is support contractor at MTF.

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PHONE: 467-7511, EXTENSION 216

FOR RELEASE:
Thursday AM's
(Released Simultaneously
from MSFC, Huntsville,
Alabama)

HUNTSVILLE, ALA. -- W. C. Fortune, who has served as Manager of the NASA Marshall Space Flight Center's Mississippi Test Facility since November, 1962, has been assigned the special task of evaluating the modes of cooperation between the main elements of the government-industry Saturn rocket team. The purpose of his study is to ascertain that maximum utilization is obtained from the giant new super rocket family now under development.

Dr. Wernher von Braun, MSFC Director, made the announcement here today.

Fortune, on active duty with the U. S. Navy for thirty-one years, retired on June 30, 1964, but continued to serve as MTF Manager. He has an extensive background in the field of rocketry and aviation dating back to 1937 when he was awarded his pilot's wings.

In making the announcement, Dr. von Braun said:

"Captain Fortune has done a fine job at our Mississippi Test Facility. Under his leadership this country's largest and most complex rocket static testing facility has literally been carved out of the swamp and piney woods.

"The development of MTF is now in its homestretch. We will test our first rocket boosters there early next year.

"His has been a challenging and rewarding task. His new mission -- to point out areas where the cooperation within the successful government-industry team can be made even more effective for future uses of our Saturn super rocket - is equally as challenging."

Fortune will work closely with industry heads engaged in the development, fabrication and assembly of the Saturn IB and Saturn V rockets. His development experience with large rockets dates back to 1947, when he was in charge of design of the launcher for a V-2, which was fired from the deck of the carrier USS Midway. This was the first large rocket to be fired at sea.

Fortune, who has resided with his family at Pass Christian on the Mississippi Gulf Coast, plans to move to California because of the heavy concentration of Saturn contractors on the West Coast.

# # # # #

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PHONE: 467-7511, EXTENSION 216

FOR RELEASE:
JUNE 2, 1965

GAINESVILLE, MISS. -- The NASA Marshall Space Flight Center's Mississippi Test Facility has signed a contract with the Hancock County Board of Supervisors to provide a patrol service in the MTF "buffer zone."

The MTF "buffer zone" contains about 100,000 acres in Hancock County surrounding the test area which is being developed to static test the first two stages of the Saturn V moon rocket.

The contract, which was effective June 1, will run through May 31, 1966, and is valued at $40,000. It is expected that there will be five patrolmen and one supervisor.

Patrolmen will work on a seven-day-week, twenty-four-hour-day basis to survey and check the property of the Government in the "buffer zone" and protect the Government's interest there. The patrolmen will ensure that no one resides in the area which has been cleared of inhabitants under easements concluded between the Government and landowners. The patrol has authority to apprehend persons engaged in illegal acts in the "buffer zone." The patrolmen will also extinguish those fires which are accessible from the roads and request assistance to combat larger fires. They may also assist the mosquito control program at MTF by making mosquito counts and reporting on rain gauges.

The Hancock County Board of Supervisors will furnish manpower, facilities, equipment and materials for the patrol, which will work out of Bay St. Louis. The vehicle to be used by the patrol will be of the same color and have similar markings as other Hancock County law enforcement vehicles.

# # # # #

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
HUNTSVILLE, ALABAMA

JUNE 25, 1965

IMMEDIATE RELEASE

PHONE: 876-1102, 876-1959
(Charles Kurtz - residence 852-2329)

HUNTSVILLE, ALA. -- Two large ground test rocket stages for checking the readiness of new Cape Kennedy launch facilities and Mississippi Test Facility test stands will arrive in New Orleans on Saturday aboard the USNS Point Barrow.

The stages - an S-IVB facility vehicle and an S-II Simulator - were manufactured on the West Coast. Both the S-IVB and S-II are upper stages of the Saturn V moon rocket. The S-IVB and S-II are upper stages of the Saturn V moon rocket. The S-IVB will also serve as the second stage for the S-IB vehicle. All are under development for the NASA-Marshall Space Flight Center at Huntsville, Alabama.

The Point Barrow, a military sea transportation service ship, left Seal Beach, California, June 13. The vessel - a converted AKD which is some 70 feet wide and 460 feet long - came through the Panama Canal and is crossing the Gulf of Mexico to New Orleans. It is making its first trip with Saturn rocket hardware.

The S-II Simulator will be off-loaded at the NASA-Michoud Operations in New Orleans and loaded onto the barge Pearl River. The Pearl River will be towed on the intra-coastal waterway to the Mississippi Test Facility. A recently completed lock there will lift the rocket carrying barge some 20 feet to an internal canal change connecting test and storage facilities.

The S-II Simulator will be the first 'space age' hardware to be brought into the Mississippi Test Facility's lock and 7 1/2 mile canal system. It will be stored in the site's Booster Storage Building and later used to check out test stands and other facilities under construction there.

The barge Pearl River will be a workhorse in the future shuttling rocket stages from Michoud to the Mississippi facility.

The Point Barrow will sail on to Cape Kennedy with the S-IVB facility vehicle. The ship is scheduled to arrive at the Cape on July 1.

The vehicle is built like a flight stage in every important detail except that no engine is installed. It was used in the recently completed checkout of new S-IVB test facilities at the Douglas-Sacramento Test Center in Sacramento, California.

Douglas Missile and Space Systems Division builds the S-IVB stages in Huntington Beach, California. North American Aviation is building the S-II at Seal Beach.

Conversion of the Point Barrow was supervised by the Marshall Center. The vessel will be used primarily by NASA to transport huge rocket stages from the West Coast.

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JUNE 28, 1965

## S-II SIMULATOR ARRIVES AT MTF

The arrival at the National Aeronautics and Space Administration's Mississippi Test Facility today of the S-II Simulator on the river barge Pearl River marks a major milestone for this rocket testing facility now in its final phase of preparation.

It will be the first time "space age" hardware has been brought into the site's 670 foot lock and 7 1/2 mile canal system.

The Simulator has the same dimensions as a "live" S-II Saturn V Apollo moon rocket second stage --- 33 feet in diameter and 81 feet long.

The S-II Simulator was built by North American Aviation, Incorporated, at Seal Beach, California. It was transported from California, through the Panama Canal, to docks at NASA's Michoud Assembly Facility aboard the USNS Point Barrow. It arrived there Saturday, was loaded on the river barge Pearl River. The Pearl River departed Michoud at 6:15 a. m. today and is scheduled to arrive at the MTF lock around noon. The trip from New Orleans is 38 miles via the intra-coastal waterway and the East Pearl River. The trip up the river from the point it junctions with the intra-coastal waterway near Pearlington, Mississippi, is about sixteen miles.

The lock, built by the Morrison-Knudsen Company under the supervision of the U.S. Army Corps of Engineers, Mobile District, is 670 feet long and 110 feet wide. The lock will lift the Simulator about 22 feet. From the lock, the Simulator will be taken to the Booster Storage Building where it will be off-loaded.

The first live stage, which will be an S-II Saturn V second stage, will travel the same route next fall from California. This stage -- designated S-II-T -- will be placed on the A-2 Saturn S-II test stand and fired early next year.

MTF is a division of the NASA Marshall C. Marshall Space Flight Center, Huntsville, Alabama. It will be the testing site for engines and stages of NASA's large launch vehicles.

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PHONE: 467-7511, EXTENSION 216

JUNE 28, 1965

IMMEDIATE RELEASE

GAINESVILLE, MISS. -- A major milestone was marked at the National Aeronautics and Space Administration's Mississippi Test Facility today when the rocket test site opened its man-made waterways to receive its first "Space Age" hardware.

The rocket which was brought up the historic East Pearl River won't fire -- it doesn't have engines -- but it will be used to check out test stands and other facilities at this southwest Mississippi rocket testing site.

The rocket stage, called a "Simulator," has the same dimensions and weight as the S-II second stage of the Saturn V moon rocket.

The S-II Simulator was built by North American Aviation, Inc., at Seal Beach, California. It was transported from California on the USNS Point Barrow, through the Panama Canal, to docks at the NASA Michoud Assembly Facility in New Orleans, Louisiana. It arrived in New Orleans Saturday and was loaded on the barge Pearl River for its 45-mile voyage to MTF.

The Pearl River left Michoud at 6:10 a. m. and arrived at MTF at 12:45 p. m. The Pearl River, with its S-II Simulator cargo, was lifted some 13 feet in MTF's navigation lock. The lock is 110 feet wide and 670 feet long.

Once through the lock, the S-II Simulator was taken by water to the test site's Booster Storage Building.

For the next several weeks, the S-II Simulator will be used to train crews and check out support facilities. It will later be used to check out the 200-foot tall S-II test stand now in its final phase of construction.

The first "live" rocket will be brought to MTF this fall and static fired early next year.

MTF is a division of the NASA George C. Marshall Space Flight Center, Huntsville, Alabama. It is under development to test engines and stages of NASA's large launch vehicles.

Construction at the site is being supervised by the U. S. Army Corps of Engineers.

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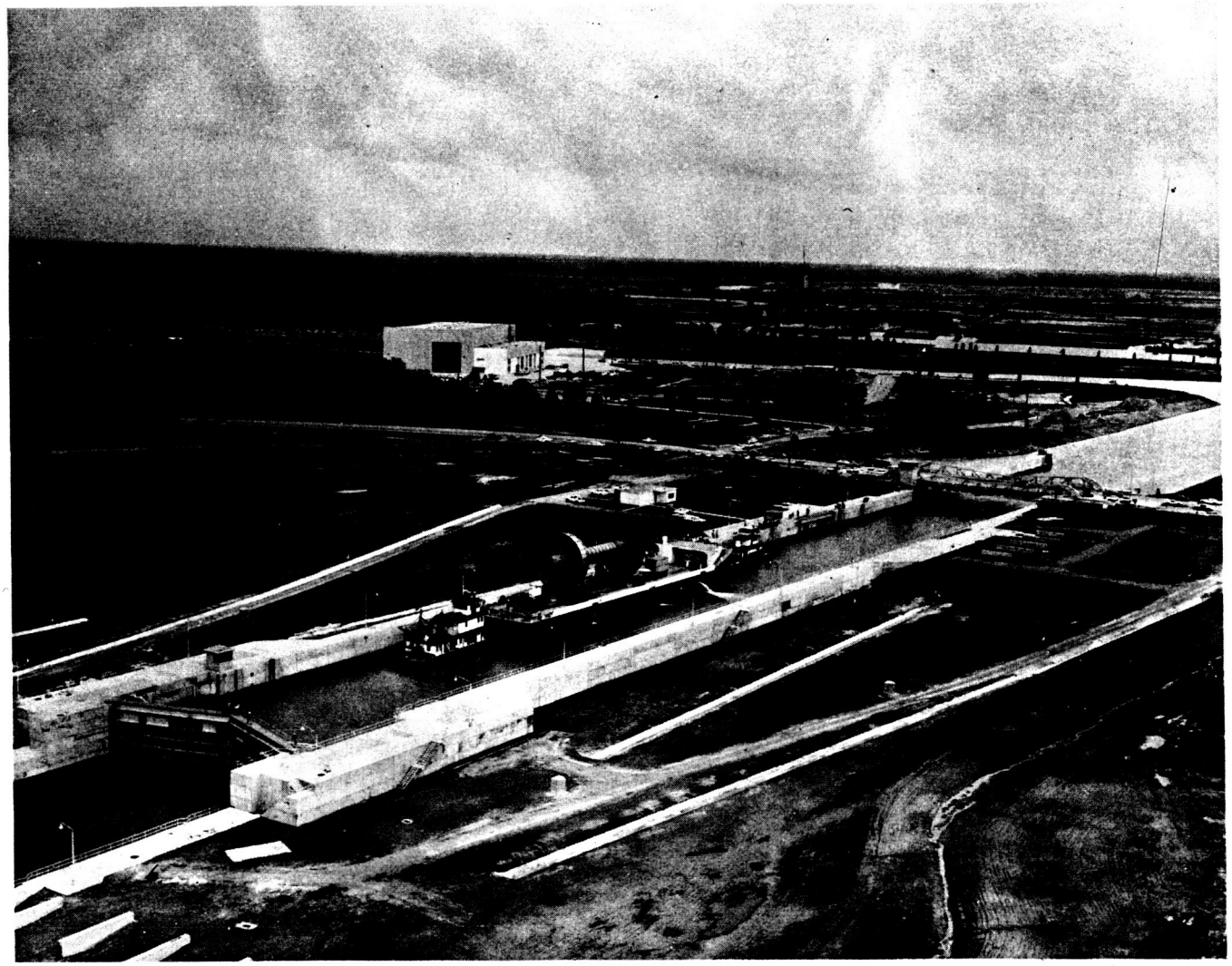

FIGURE 8

This aerial photo shows the National Aeronautics and Space Administration's Mississippi Test Facility opening its man-made waterway system to receive its first "Space Age" cargo -- an S-II Saturn V second stage Simulator -- built in California. Here, the S-II Simulator is shown aboard the river barge Pearl River leaving the MTF lock. The stage and Pearl River were lifted some 13 feet in the lock and transported to MTF's Booster Storage Building. The S-II Simulator will be used to check out test stands and other facilities at MTF. (NASA-MTF Photo)

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July 1, 1965

IMMEDIATE RELEASE

HUNTSVILLE, Ala. -- New names have been given to the NASA Marshall Space Flight Center's Saturn rocket assembly plant at New Orleans and the rocket test site under construction in Hancock County, Mississippi.

A new organization chart signed by NASA Administrator James E. Webb designates the Louisiana plant as the Michoud Assembly Facility. At the same time, he officially designated the testing installation as the Mississippi Test Facility.

The changes were made to better reflect the missions of the organizations, which are elements of the MSFC Industrial Operations. Previously, the two were officially known as Michoud Operations and Mississippi Test Operations.

# # # # #

FIGURE 9

GAINESVILLE, Miss. -- The year 1965 brought numerous top-ranking government and industry officials to visit the National Aeronautics and Space Administration's Mississippi Test Facility. Shown here chatting in the lobby of the Central Control Building at MTF are, left to right, Harry H. Gorman, Deputy Director, Administrative, Marshall Space Flight Center Paul Styles, Chief, Labor Relations, MSFC; Dr. Wernher von Braun, Director of MSFC; and Jackson M. Balch, Manager of MTF.

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July 7, 1965

IMMEDIATE RELEASE

GAINESVILLE, Miss. -- The number of employees at the National Aeronautics and Space Administration's Mississippi Test Facility has topped a new high. For the first time since construction started over two years ago the number of employees associated with the facility has passed 5,000.

The population report for this week shows a total of 5,199 persons engaged in work associated with the establishment of MTF. The breakdown shows NASA with 96 employees, 86 of whom are permanent; General Electric Company, 1,280; G.E. Subcontractors, 704; U.S. Army Corps of Engineers, 170; Corps Land Acquisition Office, 7; U.S. Weather Bureau, 8; The Boeing Company, 47; North American Aviation, Incorporated, 399; construction and installation workers, 2,494.

The Mississippi Test Facility, now entering its final phase of preparation, will static test the first two stages of the Saturn V moon rocket. MTF is a component installation of the George C. Marshall Space Flight Center, Huntsville, Alabama.

# # # # #

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PHONE: 467-7511, Extension 408 - 60

July 13, 1965

IMMEDIATE RELEASE

GAINESVILLE, Miss. -- Two 135-foot-long barges, each equipped with an insulated vacuum tank of stainless steel for the transport of liquid hydrogen at super-cold temperatures, passed through the navigation lock of the National Aeronautics and Space Administration's Mississippi Test Facility Sunday evening about 7:00 p.m. The barges were moved to the cryogenics dock and storage area where the tanks will be acceptance checked, cleaned and prepared for use in transporting fuels to the test site for stages and rocket engines of space launch vehicles.

The converted U.S. Army barges, under tow of the tug Sipsey arrived via the Mississippi Sound and the East Pearl River from Pascagoula, Mississippi, where the tanks were fabricated and installed by the Chicago Bridge and Iron Company under a NASA contract.

The barges and tug were lifted approximately 13 feet in the lock, which measures 670 feet long, to the higher elevation of the canal system in the test site. They were the first major vessels to transit the lock since last June 28 when a Saturn V second stage simulator fixture arrived.

The barge mounted tanks, 98 feet long, each have a capacity of 250,000 gallons of liquid hydrogen. The fuel, which will be transported from a gas liquefaction plant at New Orleans, must be maintained at temperatures as low as minus 425 degrees Fahrenheit.

Mississippi Test Facility, an operation of NASA's Marshall Space Flight Center, Huntsville, Alabama, is responsible for ground testing stages of the Saturn V space vehicles.

# # # # #

JULY 13, 1965

GAINESVILLE, MISS. -- Thirteen top NASA management officials from the Kennedy Space Center and the Marshall Space Flight Center received a status briefing and a tour of the facilities at NASA's Mississippi Test Facility. The officials arrived early Monday for a morning meeting with MTF's Site Manager, Jackson M. Balch. Following lunch, the group was toured through the giant rocket-testing facility where static tests of the first two stages of the Saturn V will be conducted. The group included Dr. Eberhard Rees, Deputy Director, Technical, of the Marshall Space Flight Center, and Colonel Rocco Petrone, Director, Plans, Programs and Resources, and Dr. Hans Gruene, Assistant Director for Launch Vehicle Operations, of the Kennedy Space Center.

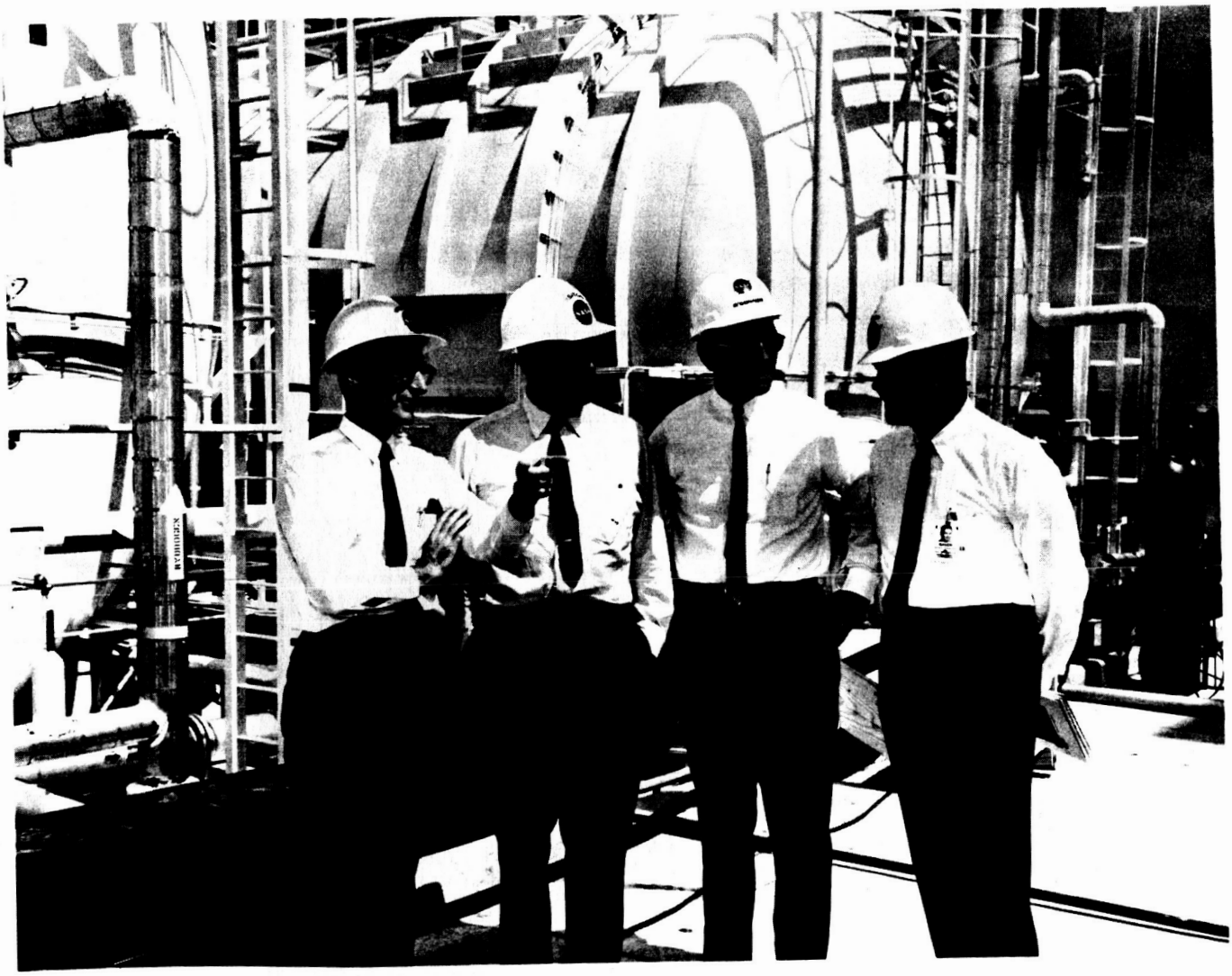

FIGURE 10

Key officials of this nation's manned space flight team visited the National Aeronautics and Space Administration's Mississippi Test Facility Friday, August 6, 1965, to review the status of the rocket testing site now in its final phase of preparation in Hancock County, Mississippi. Shown above at MTF inspecting propellant facilities are, left to right, Dr. George Mueller, Associate Administrator for Manned Space Flight, NASA, Washington, D.C.; Dr. Wernher von Braun, Director, George C. Marshall Space Flight Center, Huntsville, Alabama; General Edmund O'Connor, Director of MSFC's Industrial Operations; and Jackson M. Balch, Manager, MTF. Six other top officials from the Marshall Center accompanied the group. (NASA-MTF Photo)

PUBLIC AFFAIRS OFFICE
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GEORGE C. MARSHALL SPACE FLIGHT CENTER
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
BAY ST. LOUIS, MISSISSIPPI

JULY 22, 1965

NASA Marshall Space Flight Center is currently recruiting about 300 workers for jobs at the Mississippi Test Facility for the summer. Recruiting is being done on the basis of age -- between 16 and 21 -- through the U. S. Employment Service at four locations -- Bay St. Louis and Picayune, Mississippi, and Slidell and Bogalusa, Louisiana. This labor force is being recruited in cooperation with the Youth Opportunity Campaign and work will be performed under the direction of the U. S. Corps of Engineers.

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AUGUST 30, 1965

GAINESVILLE, MISS. -- The National Aeronautics and Space Administration's Mississippi Test Facility moved another step toward readiness yesterday when a rocket simulator was raised from a barge into a 200-foot-tall static test tower.

The simulator has the same weight and dimensions of the S-II liquid hydrogen rocket which is scheduled for first "hot" tests early next year on the same test stand.

The S-II, built by North American Aviation, Inc. at Seal Beach, Calif., is the second stage of the giant Saturn V Apollo moon rocket -- destined to send America's first astronauts to the moon.

The simulator which was placed in the stand yesterday, like the "real" rocket, is 81 feet long and 33 feet in diameter. It was brought to the base of the test tower on the shuttle barge "Pearl River" and lifted into place on the stand.

The exercise will be repeated several times to give North American Aviation crews experience needed to handle the live rocket when it arrives in October. It also allows engineers to check the cranes which lift the stage and the rocket's compatibility to the test stand.

The first rocket to be tested at MTF will be the S-II-T, a development stage now being readied in California.

MTF, a division of the George C. Marshall Space Flight Center in Huntsville, Ala., is in its final phase of development in Hancock County, Miss. to test engines and stages of NASA's large launch vehicles.

PUBLIC INFORMATION OFFICE
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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(Mack Herring, Long Beach 863-0862)

SEPTEMBER 3, 1965

IMMEDIATE RELEASE

GAINESVILLE, MISS. -- The National Aeronautics and Space Administration's Mississippi Test Facility will stage an "Open House" Labor Day to give employees, their families and the general public an opportunity to see the giant rocket testing facility now under development in Hancock County.

Open House activities will begin at 10:00 a.m. and includes presentations and motion pictures on MTF and the nation's space program, exhibits in the site's Central Control Building and a "drive-through" tour.

NASA asks that employees, their families and other visitors to first report to the Central Control Building to pick up tour maps, information material and instructions for their visit. Exhibits on the space program will be explained in the lobby of the building.

MTF is located between Bay St. Louis and Picayune on Miss. Highway 43. A sign pointing the way to the Central Control Building will be located on Highway 43. The building is an easy landmark to locate with its 90-foot observation tower.

Beginning at 10:00 a.m., presentations on the rocket test facility and the space program will be given every hour on the hour until 4:00 p.m. Open House activities will end at 6:00 p.m. All visitors are asked to be off the site at this time.

Most of the test facilities at the site have been closed to visitors for some time due to the increased construction activity.

Visitors are asked to remain in their automobiles during their stay. All buildings on the site, except the Central Control Building, will remain closed on Labor Day.

MTF, a division of the George C. Marshall Space Flight Center, is in its final phase of preparation for ground testing rocket engines and stages used in this nation's manned lunar landing program.

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SEPTEMBER 14, 1965

RESPONSE-TO-QUERIES STATEMENT ON HURRICANE BETSY AT MTF

GAINESVILLE, MISS. -- Damage caused by Hurricane Betsy at the NASA Mississippi Test Facility was comparatively light. Only superficial damage was experienced by structures, roads and grounds.

Some difficulties may be encountered in the complex electrical and electronic systems at the site due to moisture. It will be several days, however, before such damage can be fully assessed.

Winds of about 100 miles per hour and heavy rains were experienced at the rocket test site Thursday night, September 9, and the early morning hours Friday, September 10.

Hurricane watch and preliminary precautionary measures were initiated Wednesday as the storm approached. The MTF emergency plan was put into effect Thursday morning when Betsy began taking a more northerly direction.

The site was officially closed Thursday at 1:30 P.M. and all employees, except personnel involved in emergency operations, were dismissed. The base was back in normal operation Monday, September 13.

About 350 residents from low lying areas surrounding the site -- primarily from Pearlington and Bay St. Louis -- spent Thursday night at MTF's three-story Office and Administration Building. A few NASA families who had to evacuate their homes were among the number.

Evacuees began arriving at the site about dark seeking refuge from the storm. They continued through the night and left the site the next morning.

Eight fishing boats took refuge in MTF's boat harbor just off the East Pearl River until the threat of the storm passed.

MTF, a division of the George C. Marshall Space Flight Center, is in its final phase of construction to static test engines and stages used in this nation's space exploration program.

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IMMEDIATE RELEASE

October 1, 1965

GAINESVILLE, Miss. - - The first complete test model of the second stage of the giant Saturn V launch vehicle left Seal Beach, California, today aboard the converted Navy ship, USS Point Barrow bound for the National Aeronautics and Space Administration's Mississippi Test Facility in Hancock County, Mississippi.

The S-II stage, built by North American Aviation's Space and Information Systems Division, will travel to the NASA Marshall Space Flight Center's rocket testing facility via the Panama Canal. The 4,000 mile trip will take about two weeks.

Designated the S-II-T, the stage is a flight weight, all-systems test vehicle which nearly duplicates the actual flight stages, slated to be launched from the NASA Kennedy Space Center beginning in 1967.

The S-II-T's primary mission is to provide development testing of integrated S-II flight systems and hardware under static firing conditions.

S-II firings are slated to begin early next year on a test stand (A-2) now nearing completion at MTF. Other missions of the S-II-T include the verification of ground support equipment capabilities, aid in the transition from testing heavy battleship type test models to flight weight structures and to serve as the vehicle used to activate the test site.

The S-II is 81 1/2 feet long and 33 feet in diameter. It is powered by five J-2 engines, developing a total thrust of one million pounds. The J-2 uses high energy liquid hydrogen/liquid oxygen propellants.

The stage is expected to arrive at the Marshall Center's Michoud Assembly Facility during the second week of October. There it will be transferred to a barge for the short trip via the Intracoastal Waterway and the East Pearl River to MTF.

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FOR IMMEDIATE RELEASE

October 14, 1965

GAINESVILLE, Miss. - - The first complete test model of the second stage of the giant Saturn V launch vehicle, now enroute from Seal Beach, California aboard the USNS Point Barrow, is scheduled to arrive at the National Aeronautics and Space Administration's Mississippi Test Facility this weekend.

The rocket, 81 1/2 feet long and 33 feet in diameter, passed through the Panama Canal at 3:00 p.m. (CST), Monday, October 11, on board the converted Navy ship. It is scheduled to arrive Saturday at the dock of the NASA Michoud Assembly Facility in eastern New Orleans, where it will be placed aboard a barge for the 45-mile trip via the intracoastal Waterway and the East Pearl River to MTF.

Designated the S-II-T, the stage is a flight-weight, all systems test vehicle which will undergo final development testing at MTF. The S-II-T nearly duplicates actual flight stages to be launched from the NASA Kennedy Space Center as part of Saturn V vehicles.

The S-II stage is built by North American Aviation's Space and Information Systems Division.

Following arrival at the Mississippi Test Facility, the stage will be towed to the vehicle service dock for removal of protective covering and subsequently to the new 200-foot-high static test stand.

The Mississippi Test Facility is a division of NASA's George C. Marshall Space Flight Center at Huntsville, Alabama.

The initial mission of the rocket proving ground, now nearing operational status, is testing the first and second stages of the Saturn V.

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IMMEDIATE RELEASE

October 18, 1965

GAINESVILLE, Miss. -- The first rocket arrived Sunday, October 17, at the National Aeronautics and Space Administration's Mississippi Test Facility in Hancock County, completing a 4,000-mile, 17-day voyage from Seal Beach, California.

Designated the S-II-T, it is an all-systems test model of the second stage of the giant Saturn V launch vehicle which will boost American astronauts to the moon.

The stage, 81 1/2 feet long and 33 feet in diameter, entered the navigation lock at the test site at 12:45 p.m. aboard the barge Little Lake and was moved to the stage transfer dock. Following removal of protective covering and inspection, the S-II-T is scheduled to be barged to the new S-II test stand for installation and subsequent testing.

Arrival of the rocket came only 29 months after the first tree was cut and construction began on May 17, 1963, at the NASA proving ground for stages of the free world's most powerful space propulsion vehicles. The monumental task of converting over 13,000 acres of forest and swampland into a modern, $260 million ground testing laboratory has involved as many as 30 prime contractors and 250 subcontractors.

The S-II-T was developed and built by the Space and Information Systems Division of North American Aviation, Incorporated, at Seal Beach, California. The propulsion system for the S-II stage is a cluster of five J-2 engines, developed by NAA's Rocketdyne Division, which generate an aggregate thrust of 1,000,000 pounds, or more than 21 million horsepower.

The converted U.S. Navy Ship Point Barrow transported the rocket from Seal Beach via the Panama Canal to a dock at the NASA Michoud Assembly Facility in New Orleans. It was there placed aboard the Little Lake for the 45-mile trip via the Intracoastal Canal and the East Pearl River to MTF.

Mississippi Test Facility is a division of the George C. Marshall Space Flight Center, Huntsville, Alabama. The Marshall Center has the responsibility for developing NASA's large launch vehicles.

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FOR IMMEDIATE RELEASE

October 21, 1965

GAINESVILLE, Miss. -- A gas turbine powered tugboat, the first ever built, was delivered Monday to the National Aeronautics and Space Administration's Mississippi Test Facility -- just in time to push its first rocket through the test site's canal system.

The "space age" tugboat, which burns RP-1 rocket fuel, was locked into the test facility, turned over to the government and immediately turned over to its operating contractor where it could be used to push the site's first rocket some two miles to its static test stand.

The 69-foot-long Clermont will perform a variety of chores in connection with future space rocket static firings at this Hancock County, Mississippi facility, which is an element of the Marshall Space Flight Center, Huntsville, Alabama. Main duties will be to berth and tow space vehicles and cryogenics tanker barges in the inland canal system.

The vessel slid into the water September 28. Southern Shipbuilding Corporation, of Slidell, Louisiana, completed the final designs and constructed the vessel. The Solar Corporation, of San Diego, designed and built the 1,000 horsepower turbine engine which weighs only 450 pounds.

Successful trial cruises were completed a week ago (October 11) on Lake Pontchartrain near New Orleans.

The technical staff of the MSFC Test Laboratory prepared the preliminary design and proposed the gas turbine propulsion system.

In addition to the tugboat work, the Clermont will serve as a fire boat for test stands linked by the canals. It will also provide auxiliary fire protection for barge tankers used to store highly explosive rocket propellants to be used at the Mississippi Test Facility.

Equipped with automatic monitors, the vessel can direct a solid stream of water, capable of knocking down a brick wall at 300 feet; or envelope a large cryogenics tanker barge with a heavy mist. The huge water pump is driven off the main engine shaft and absorbs one-third of the 1,000 horsepower when in use. It pumps 2,000 gallons per minute.

Herbert Evans of the Test Laboratory staff said the engine was equipped with two huge alternators to provide electricity, both alternating and direct current.

Evans said the pilot can operate the vessel alone. He said the engine compartment requires no manpower and is virtually maintenance free.

The boat will be operated by General Electric Company support personnel at MTF.

Evans said the vessel was named Clermont because this is the 200th anniversary of the birth of Robert Fulton, who built the first successful steamboat. It was named Clermont.

"Since this is the first gas turbine tugboat", Evans said, "we decided to name it in honor of the original steamboat".

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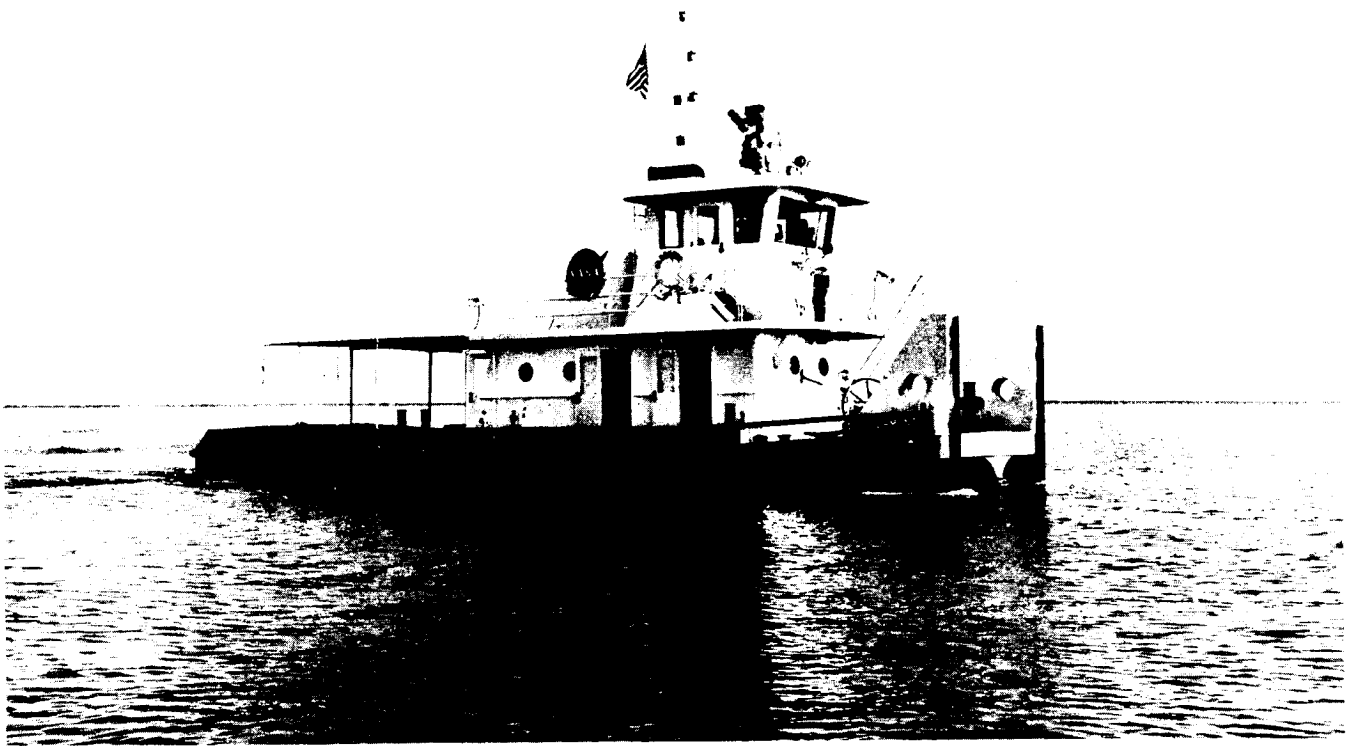

FIGURE 11

GAINESVILLE, Miss. -- This is the Clermont, the world's only gas turbine powered tugboat. It was turned over to the National Aeronautics and Space Administration's Mississippi Test Facility in 1965 for the primary purpose of towing and berthing cryogenic tanker barges and stage barges. A second purpose of the Clermont, which runs off RP-I fuel, is to act as a fireboat. It can shoot out a stream of water capable of knocking down a brick wall or it can envelop an entire cryogenics barge in a fine water mist.

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November 4, 1965
FOR RELEASE:
Immediately

GAINESVILLE, Miss. -- Six key appointments at the National Aeronautics and Space Administration's Mississippi Test Facility were announced today by Jackson M. Balch, MTF Manager.

Named were Henry F. Auter as Deputy Manager and Chief of the Projects Control Office; Lt. Col. Frederic A. Frech, Assistant Manager for Construction and Installation; Waldo H. Dearing, Chief of the Management Support Office; Myron L. Myers and Robert A. Bush, Project Managers for S-IC and S-II operations, respectively; and Myrl E. Sanders, Project Manager for support activities.

Auter, before coming to Mississippi, was with the George C. Marshall Space Flight Center, Huntsville, Ala., MTF's parent organization. He has been one of the key personnel from Marshall concerned with the rocket testing site since its very beginning.

Prior to his coming to Mississippi, he served as Chief of the Electric Systems Engineering Branch, Test Laboratory, Marshall Space Flight Center, in Huntsville.

A native of Vicksburg, Miss., Auter was graduated from Mississippi State University with a degree in electrical engineering. He is a registered professional engineer in Alabama.

Auter was in the Army during World War II and served in the Air Force from 1951 to 1953, during which time he was instrumentation officer at the Atlantic Missile Range. He is at present a Major in the Air Force Reserve.

Frech, the new MTF assistant manager, has been Area Engineer for the Army Corps of Engineers at the Air Force's Arnold Engineering Development Center in Tullahoma, Tenn., since September 1964.

He was responsible at Arnold for the completion and testing of an Aerospace Environmental Chamber (Mark I), a huge stainless steel chamber with vacuum pumping and cryogenic facilities to simulate conditions encountered by space vehicles from launch to orbiting at altitudes of 300 miles.

Frech received his Master of Science degree from Harvard University and formerly taught physics at the United States Military Academy at West Point. He was graduated from West Point in 1946, completed studies at the U.S. Army Command and General Staff College and is a registered professional engineer in the State of New York.

Frech's military service includes assignments with the 1st Engineer Combat Battalion and other engineer units, and staff duty with Headquarters, United States Army, Europe.

Dearing, MTF's new Chief of the Management Support Office, formerly was executive assistant to the Depot Commander at the Sioux Army Depot, where was the top ranking civilian official.

Dearing's military experience began in April 1942 until October 1945, when he served as "buck" sergeant, leading a mortar squad in the invasion of Normandy and five major European campaigns.

He was awarded the Bronze Arrowhead for the Normandy landing, battle stars for each of the campaigns and a Presidential Citation for combat action.

Dearing, after his military service, spent a year with the War Assets Administration and was employed from September 1947 to January 1948, as a wholesale hardware salesman in northwestern Iowa.

He came to Sioux as a management analyst in 1948 and was promoted progressively until he was named executive assistant to the Depot Commander.

Myers comes to MTF as S-IC project manager from Huntsville where he was S-IC Facilities Manager working under the Saturn V program.

Bush, as the S-II Project Manager, also comes to Mississippi from Huntsville where he was working as the S-II Facilities Manager. He was involved there in erecting S-II facilities throughout the country.

Sanders is a graduate of Mississippi State University and formerly was with the Resources Management Office at the Marshall Space Flight Center in Huntsville. Sanders, also, has been one of the key figures in the development of the Mississippi facility.

MTF, now in its final phases of development, will be the static testing site for engines and stages of NASA's large space vehicles.

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FOR IMMEDIATE RELEASE:

November 24, 1965

GAINESVILLE, Miss. -- Sportsmen are reminded that hunting is prohibited in the 13,424 acre fee area of the National Aeronautics and Space Administration's Mississippi Test Facility.

Thousands of MTF personnel are working in the vicinity and the discharging of firearms could endanger members of field survey crews and other personnel.

The fee area, which is fenced, clearly marked and posted, also contains intricate instrumentation and highly volatile gas in use and in storage at MTF.

Hunting in the buffer zone, the 128,526-acre tract of land surrounding MTF's fee area, is regulated solely by the individual land owners and hunting permission is left up to the land owners and is governed by the State of Mississippi.

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IMMEDIATE RELEASE:

December 23, 1965

GAINESVILLE, Miss. - - Jackson M. Balch, Manager of the National Aeronautics and Space Administration's Mississippi Test Facility, issued the following Christmas message to employees of the giant rocket testing site today, which is nearing operational status after almost three years of development:

"As the year 1965 comes to an end, let us pause briefly in the day-by-day urgency of our tasks, and turn our thoughts to the approaching Christmas season. I sincerely hope that Christmas will bring to you and your family the gifts of peace, joy, and lasting contentment.

"As we recall the birth of the Christ Child, let us remember the eternal timeliness of the message he bore for "Peace on Earth, good will to men". The need for peace and good will toward all men has never been more urgent. Let us be thankful that we live in a land where liberty, justice, and dignity of the individual have meaning, and where opportunity is extended equally to all.

"Here at the Mississippi Test Facility we have an important role in a program of national significance. This has been a year of construction and preparation, which will bear fruits in 1966 as our first test stands become operational. The eyes of the nation will be turned toward us as never before. We must not only demonstrate technical proficiency; we must set an example in efficient management of the nation's resources which are entrusted to us. Success demands that we make skillful use of all available human resources.

"I want to thank each one of you for your part in the progress we have made thus far. And I know I can depend on you for your best performance in 1966. I wish you a very Merry Christmas, and the best of health and happiness in the New Year."

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# IX

# TEST LABORATORY - HISTORICAL REPORT

January 1, 1965 - December 31, 1965

# TEST LABORATORY HISTORICAL REPORT

January 1, 1965 - December 31, 1965

# TEST LABROATORY HISTORICAL REPORT

January 1, 1965 - December 31, 1965

## I SATURN IB PROGRAM

### A. S-IB Stage

#### 1. S-IB-1

Modifications to the test tower were completed and the first S-IB stage, S-IB-1, was installed in the test tower east on March 15, 1965. The stage arrived from Michoud on March 14, 1965.

Two propellant loading tests were performed on March 24 and 29, 1965. The purpose of the load tests was to leak check the stage, investigate lox boiloff rates, establish tanking and lox bubbling procedures for the required small lox tank ullage of 1.7%.

A successful 35 second test was performed on April 1, 1965. Cutoff was initiated by control operator after scheduled duration. All test objectives were met.

The long duration acceptance firing, test SA-26, was conducted on April 13, 1965, for a total duration of 145 seconds from ignition command to inboard engine cutoff. Outboard engine cutoff occurred at 138.2 seconds. All systems operated satisfactorily.

The stage was removed from the test stand on April 19, 1965, and shipped back to Michoud on April 20, 1965.

#### 2. S-IB-2

Stage S-IB-2 arrived at MSFC by barge from Michoud on June 19, 1965. During preparations of the stage for erection and installation, several large dents appeared in the black painted section of fuel tank No. 2. The dents appeared when the tank was exposed to direct sunlight and disappeared when the tank was shaded. Temperature differences of $20^{\circ}$ F were measured

between the black painted and white painted portions of the tank. No permanent dents occurred. The stage was prepared and checked out and a propellant loading test was conducted on June 30, 1965.

Static test SA-27 was conducted on July 8, 1965, and prematurely terminated after three seconds duration due to a malfunction of the thrust OK pressure switch No. 2 on engine No. 4. Test SA-28 was conducted on July 9, 1965, for a duration of 35 seconds as scheduled. Performance was normal. A full duration test, SA-29,was successfully performed on July 20, 1965, for a duration of 144.2 seconds.

The stage was removed from the test stand on July 29, 1965, and shipped to Michoud on August 1, 1965. The total time from arrival at MSFC until leaving Huntsville was six weeks.

3. S-IB-3

S-IB-3 arrived at MSFC on September 16, 1965, and was installed in the test tower east on September 17, 1965. After functional checkouts, a propellant loading test was performed on October 1, 1965.

The first static firing of stage S-IB-3 was performed on October 12, 1965, for a duration of 35 seconds. All test objectives were achieved. The second static firing was conducted on October 26, 1965, with a duration of 146 seconds. Cutoff occurred with lox depletion as scheduled. All systems performed satisfactorily. The stage was removed from the test stand on November 3, 1965, and shipped to Michoud on November 4, 1965.

4. S-IB-4

Stage S-IB-4 was installed in the static test tower east on December 14, 1965. After stage alignment and connecting stage to ground equipment, functional tests and lox and fuel system leak checks were performed. The hydraulic system of engine No. 1 was found to be contaminated with rubber and metallic particles, probably originating in the accumulator. The complete

system, including actuators, was removed and a spare system (provided by Michoud) was installed.

The propellant loading test is scheduled for January 5, 1966.

B. H-1 Single Engine Tests

Thirteen H-1 single engine tests were conducted at the Power Plant Test Stand during the first quarter of 1965. The total duration was 1,239 seconds. The test stand was placed on standby status for the remainder of the year. During this time, modifications were made to the deflector pit, instrumentation, and tie-in with the S-IVB test stand.

The following table summarizes these tests.

| Test No. | Date | Duration (Seconds) | Objective |
|---|---|---|---|
| P1-460 | 1/6/65 | 140 | No. 3 in series of up-rated (200K) engine testing |
| P1-461 | 1/25/65 | 59 | First MSFC firing of 5602 injector. This type injector is presently the standard injector for the Saturn IB engines. |
| P1-462 | 1/27/65 | 140 | |
| P1-463 | 1/29/65 | 100 | |
| P1-464 | 2/3/65 | 40 | |
| P1-465 | 2/4/65 | 60 | |
| P1-466 | 2/6/65 | 110 | |
| P1-467 | 2/11/65 | 60 | To support the H-1 and F-1 "Pogo" investigation, a program was begun to inject $GN_2$ and $H_e$ intermittently into the fuel and lox suction lines to determine the effect on engine performance. Up to 2% by volume of $GN_2$ and $H_e$ was injected with no detrimental effect. |
| P1-468 | 2/13/65 | 60 | |
| P1-469 | 2/26/65 | 100 | |
| P1-470 | 3/2/65 | 130 | |
| P1-471 | 3/4/65 | 100 | |
| P1-472 | 3/9/65 | 140 | |

C. RL-10A-3 Engine

Engine No. 1811 was installed in the test stand in February 1965 and the facility was placed on standby for R&D to use in case trouble developed on the S-IV stage. No other activity was conducted at this facility.

D. Saturn IB Dynamic Testing

Since P&VE Laboratory is the lead laboratory for dynamic testing, this laboratory will no longer report on this item.

E. 200K H-1 Turbopump Testing

This program was established to support the Saturn IB Vehicle "Pogo" study. The program is necessary to establish relationship between suction line resonant frequency and pump suction pressure for the S-IB oxidizer and fuel delivery systems.

Construction and test stand modifications were completed in July 1965, and testing began immediately and continued through the remainder of this period. Approximately 30% of the Saturn IB "Pogo" testing remained to be conducted at the close of this report period.

F. Ground Support Equipment

1. Umbilical Swing Arms for LC-34 and LC-37 (Saturn IB)

The tests of the swing arms, which provide electrical, pneumatic, air-conditioning, and propellant services to the various stages of the Saturn IB vehicle, were conducted for KSC to qualify the swing arms and their associated equipment under as close to actual vehicle launch conditions as possible.

The tests were performed by CCSD (Chrysler Corporation Space Division) personnel under the technical direction of Test Laboratory.

Arms No. 1, No. 2, No. 3, and No. 4 for LC-34 were received during the period from February 17, through March 23. Numerous modifications were incorporated into the arms and their associated equipment ranging from installation of vehicle fluid service lines, to modifications of the umbilical carriers.

Testing of the arms was satisfactorily completed during the period from April 13 through June 21. The arms were turned over to KSC for refurbishment and shipment to the Cape on completion of the test program.

During the month of July, modifications were completed on all four swing arms for LC-37 and the arms were installed into the test stands.

An abbreviated test program was conducted (July 21-23) on the backup ground umbilical housing for the service module (Arm 4). The program consisted of pneumatic disconnects and hydraulic lanyard retracts without flight vehicle simulation or swing arm rotation. The housing was found to be satisfactory, as tested, and subsequently shipped to Cape Kennedy for use on LC-34. A special test program was satisfactorily conducted on the electrical eject plate of the S-IVB forward umbilical carrier assembly. This mechanism is for preflight checkout. As a result of the test program conducted with the new pneumatic lock-pin installed in swing arm 4 under various wind load conditions, it was concluded that the new design is acceptable for use on Saturn IB swing arms.

All tests were satisfactorily completed on the swing arms, umbilical housings, and associated equipment. The tests were conducted under ambient and cryogenic ($LN_2$) conditions with satisfactory results. The arms were then removed from the test towers, weighed, the centers of gravity located, loaded on the carriers and transporters, and shipped to Cape Kennedy during the period from October 15 through November 24. All associated equipment was shipped with the arms (umbilical housings, control panels, etc.).

2. Apollo Access Arm for LC-34

Tests of the access arms were conducted for Kennedy Space Center to verify the structural integrity of the arm truss and environmental chamber, and to qualify the system for use during Saturn IB space vehicle launches.

Tests were begun on the LC-34 Apollo access arm on September 13, when the arm truss structure was mated to the arm actuating assembly. Since the environmental chamber (EC) had not been delivered at that time, a fixture simulating the EC weight was fabricated and installed on the arm. Strain gauge data were recorded and analyzed at that time with results appearing to be normal. Deflection of the arm was also measured.

Several arm rotation tests were run (both manual and automatic) to determine proper rotation rates and operating pressure. Desired results were not obtained due to improper design of the hydraulic return line shut-off valve cam plate. A re-design is being investigated by Test Laboratory and KSC.

The environmental chamber was delivered to Test Laboratory October 1. Strain gauges were installed on the structure and the chamber was installed on the arm on October 4, 1965. Several modifications are being made in order to make the chamber operational for tests.

A new cam plate was designed, fabricated, and installed in the hydraulic return shutoff system resulting in satisfactory arm swing performance.

The environmental chamber (EC) was installed and preliminary tests and several modifications (orifices resized, APD cylinders changed, timing adjusted) were made before an arm swing and mating to the command module (CM) could be accomplished. Mating of the EC with the CM was unsatisfactory because of deflection of the APD and extension platform. The EC was removed from the truss and reinstalled in a rotated position alleviating the above mentioned APD and extension platform deflection. However, the seal problem was not solved as a 1" gap still existed between the hood seal and the capsule skin.

Since there was an urgent need for the access arm at LC-34, Cape Kennedy, Florida, for the first Saturn IB (SA-201) flight, a hurried effort was made to obtain an operational system. For this reason, many temporary "fixes" were incorporated into the system. The system was made operational, but there was no time to test for reliability and fully qualify the complete access arm. The access arm was disassembled Wednesday, October 27, 1965, and the last shipment, the EC, left for Cape Kennedy (LC-34) on October 29,1965.

3. "Q" Ball Cover and Retract Mechanism

The "Q" ball cover provides protection for the instrumentation ports on the nose cone of the Saturn IB space vehicles. The retract mechanism removes the cover 6 to 8 minutes prior to launch. The test program was satisfactorily finished and the equipment shipped to KSC on November 13, 1965. It was determined that a protective device must be installed on the weight drop guide to prevent the cover from damaging the guide when removed. The test report is now being written.

II SATURN V PROGRAM

A. S-IC-T

The first Saturn V Booster, S-IC-T, was delivered to the S-IC Test Stand on March 1, 1965. Installation was accomplished in approximately two and one half hours. The booster was aligned, positioned, and preclamped in the test stand. Load tests of the thrust structure were conducted during March 8 - 10, 1965.

Fifteen percent lox loading was accomplished on March 24. The tanks were pressurized for leak checks on March 25, and leak checks performed. Five engines were installed during March 27 - 30, 1965.

Test No. S-IC-01, the first one-engine firing, was conducted on April 9, 1965, at 4:20 p.m. The test was unintentionally terminated by operating personnel at approximately 40% thrust. Test No. S-IC-02 was made the same date at 6:45 p.m. The test ran for approximately 2.5 seconds and

was automatically terminated by a safety circuit. The cause was a broken wire in a cannon connector. Test No. S-IC-03 was successfully performed on April 10, 1965, at 5:10 p.m. for a scheduled duration of 16 seconds.

The first five engine test, S-IC-04, occurred on April 16, 1965, for a scheduled duration of 6.5 seconds. Performance was as expected.

Test S-IC-05 was conducted on May 6, 1965, for a planned duration of 15.58 seconds. Performance was as expected. Engine No. 1 was gimbaled.

Test S-IC-06 was successfully conducted on May 20, 1965. Console cutoff was initiated at 40.8 seconds of mainstage after attaining the scheduled duration.

Test S-IC-07 was successfully conducted on June 8, 1965, for a scheduled duration of 41.1 seconds.

Test S-IC-08 was successfully conducted on June 11, 1965, for a scheduled duration of 90.9 seconds. Post-test inspection revealed cracks in the main injectors on engine position numbers 1, 2, 4, and 5. This necessitated removal of the engines for injector replacement.

The engines were reinstalled and test No. S-IC-09 was conducted on July 29, 1965, for a duration of 17.6 seconds. The intended duration was 40 seconds. Engine cutoff was initiated by an observer monitoring the lox pump inlet pressure.

Test No. S-IC-10 was conducted on August 5, 1965. This was the first duration run, with cutoff given at lox depletion. Run time was 143.6 seconds. The test was highly successful and all test objectives were accomplished.

The S-IC-T stage accumulated static firing time through test S-IC-10 was 379.3 seconds. This concluded the S-IC-T manual configuration firings.

Test No. S-IC-11, first automatic configuration, was successfully conducted on October 8, 1965, for a scheduled duration of 45 seconds.

Test No. S-IC-12 "automatic" was on November 3, 1965. The test was inadvertently terminated by the lox tank ullage pressure redline observer at 90.5 seconds. Intended duration was 145 seconds.

Test No. S-IC-13 "automatic" was successfully conducted on November 24, 1965, for inboard engine duration of 148.4 seconds. The outboard engines were cutoff approximately five seconds later, as planned.

Test No. S-IC-14 "automatic" was successfully conducted on December 9, 1965, for a planned inboard engine duration of 146.07 seconds. The outboard engines were cutoff 3.95 seconds later as programmed.

Test No. S-IC-15 "automatic" was conducted on December 16, 1965. Cutoff of engine position No. 5 was given as scheduled by the firing panel operator at 40.98 seconds mainstage. Approximately five seconds later, the outboard engines were cut off. The test was successful.

Preparations began for removal of the S-IC-T stage from the test stand, which is scheduled for January 17, 1966. The S-IC-1 (first flight stage) is scheduled for installation in the test stand on January 24, 1966.

B. F-1 Engine Testing (East Area)

Thirty test firings were performed on the west side of the east area (S-1) static test tower for a total of 1771.09 seconds.

Purpose of these tests was to (1) calibrate engines for S-IC-T and S-IC-1; (2) Investigate fuel system pressure oscillations; (3) Evaluate 30% alcohol-water prefill; and (4) Determine injector plate temperature during start transition; etc.

Test numbers, firing dates, and durations are shown in the following table.

| Test No. | Date | Duration (Sec.) | Test No. | Date | Duration (Sec) |
|---|---|---|---|---|---|
| TWF-042 | 1/11/65 | 0 | TWF-057 | 5/27/65 | 95.7 |
| TWF-043 | 1/19/65 | 28.26 | TWF-058 | 6/7/65 | 35.8 |
| TWF-044 | 1/20/65 | 124.45 | TWF-059 | 6/18/65 | 3.7 |
| TWF-045 | 1/21/65 | 121.52 | TWF-060 | 6/18/65 | 7.5 |
| TWF-046 | 1/23/65 | 34.03 | TWF-061 | 6/18/65 | 94.0 |
| TWF-047 | 2/5/65 | 100.98 | TWF-062 | 8/25/65 | 0.58 |
| TWF-048 | 2/10/65 | 65.61 | TWF-063 | 8/26/65 | 40.51 |
| TWF-049 | 2/13/65 | 48.01 | TWF-064 | 8/27/65 | 83.47 |
| TWF-050 | 2/18/65 | 48.00 | TWF-065 | 9/2/65 | 92.91 |
| TWF-051 | 2/26/65 | 95.63 | TWF-066 | 9/13/65 | 56.11 |
| TWF-052 | 3/1/65 | 56.24 | TWF-067 | 9/22/65 | 85.81 |
| TWF-053 | 3/10/65 | 56.24 | TWF-068 | 9/23/65 | 90.62 |
| TWF-054 | 3/18/65 | 60.87 | TWF-069 | 9/30/65 | 35.74 |
| TWF-055 | 3/26/65 | 60.37 | TWF-070 | 11/16/65 | 56.46 |
| TWF-056 | 5/26/65 | 35.9 | TWF-071 | 11/30/65 | 56.07 |

C. F-1 Engine Testing (West Area)

Buildup for the initial firing was completed June 1965. Testing began on July 8, 1965. Major objectives of these tests were (1) Facility checkout; (2) Engine performance level; (3) Lox low level cutoff sensor evaluation; and (4) TVC system compliance evaluation.

The following table summarizes the tests conducted on the F-1 test stand - West Area.

| Test No. | Date | Duration (Sec.) | Test No. | Date | Duration (Sec.) |
|---|---|---|---|---|---|
| FW-001 | 7/8/65 | 9.78 | FW-009 | 8/13/65 | 144.23 |
| FW-002 | 7/12/65 | 35.42 | FW-010 | 8/17/65 | 57.91 |
| FW-003 | 7/19/65 | 0.0 | FW-011 | 8/18/65 | 59.26 |
| FW-004 | 7/19/65 | 79.54 | FW-012 | 8/20/65 | 145.37 |
| FW-005 | 7/21/65 | 145.20 | FW-013 | 8/24/65 | 154.14 |
| FW-006 | 8/11/65 | 36.43 | FW-014 | 9/15/65 | 155.95 |
| FW-007 | 8/12/65 | 63.65 | FW-015 | 9/17/65 | 147.83 |
| FW-008 | 8/13/65 | 7.83 | FW-016 | 10/15/65 | 59.79 |

Sixteen tests were conducted for a total duration of 1,302.33 seconds The total duration of all F-1 engine tests was 3,073.42 seconds.

D. S-IC (Model) Sound Suppression Program

A cluster of five model engines, capable of producing 30,000 pounds thrust each, are being tested to study methods of reducing the sound that will be generated by the Saturn V booster during static firings.

Testing continued throughout this period with various modifications to the sound suppressor hardware in an effort to further reduce the sound that is generated by the Saturn V booster and to determine the most feasible method of reducing the sound.

Thirty three tests were conducted during the period January 6, 1965, through September 20, 1965, completing the test program for this facility. The facility has been put into standby condition (engines and turbopump intact) with the exception of the main propellant tankage. This tank is being acquired by the Power Plant Test Stand for extended H-1 engine testing.

E. Liquid Oxygen Slosh Program (One third scale)

The Lox Slosh Facility, a 40% scale model of the Saturn V, S-IC stage, lox tank and suction lines, was established to conduct tests in the area tank pressurization and propellant geysering, sloshing, and tanking phenomena.

Wyle Laboratories started cleaning the lox slosh tank in February 1965, and completed in March 1965. The lox catch tank was found to be contaminated and cleaning operations began in mid-March and were completed in April 1965.

Limited testing began on May 5, 1965. Due to testing at the adjacent Liquid Hydrogen Facility, testing was limited during this period (see next item).

F. Liquid Hydrogen Slosh Testing

This program is to support studies in the area of $LH_2$ propellant feed system, and lox feed systems in an ellipsodial tank.

The first test was performed on January 30, 1965. The purpose of the test was to obtain data to verify and refine analytical methods of describing pressure and temperature variation related to pressurization and stratification in a $LH_2$ tank. The test consisted of a liquid hydrogen pressurized drain from the S-IV Battleship fuel tank to a storage tank. The pressurant gas, hydrogen, was obtained by flowing $LH_2$ through a H-1 heat exchanger. A S-3D gas generator was used as the heat source. The S-IV Battleship lox compartment was filled with liquid nitrogen. The drain time was 343 seconds. A review of the data indicated there were no malfunctions.

Testing was suspended in March 1965, in order to make facility modifications to the vent and burnstack system. Testing began again on August 6, 1965, and continued throughout the remainder of the period.

G. Interstage Environmental Program

This program is being conducted to study the S-IC to S-II interstage environment of the Saturn V vehicle during countdown and/or hold periods with propellants aboard. Various interstage purge manifold configurations are being tested to determine the one most effective in maintaining an acceptable interstage thermal environment.

A 1/5 scale S-IC/S-II interstage compartment simulator was established at the "Y" Manifold Facility by utilizing two 70" diameter lox tanks, one atop the other.

In March, modifications were started to the facility for future interstage and $LN_2$ Stratification Test Program. Modifications included the installation of a $LN_2$ bath heat exchanger for conditioning of purge and pressurant gases. Testing was resumed in June 1965.

This phase of testing was completed in September 1965.

The S-II/S-IVB test program was established following the S-IC/S-II test program and was successfully completed on December 22, 1965.

H. F-1 Turbopump Test Facility

This facility provides the capability to perform checkout calibration, qualification, and development test on S-IC/F-1 turbopump propellant feed systems. Full size true configuration lox and fuel lines with a gas generator driven F-1 turbopump mounted on a thrust chamber simulates the S-IC flow system from the suction line to the main shutoff valve at the engine.

Due to higher priority work, flow and surge testing of the S-IC lox suction components (suction lines, prevalves, and PVC) did not begin until June 1965. In the meantime, tests were conducted on (1) Turbopump mapping; (2) Gas injection; (3) Fuel pump cavitation and (4) "Pogo" testing, etc.

I. F-1 Heat Exchanger Development Tests

This program was established to determine the reliability and verify the design of the F-1 heat exchanger.

Through February 1965, the heat exchanger had accumulated 1,373 seconds of firing time since cleaning. The heat exchanger was sent to ME Laboratory for cleaning and upon return a program was initiated to conduct tests with a "clean" heat exchanger.

The heat exchanger was returned in May 1965, and testing began with the "clean" heat exchanger and continued for the remainder of the period.

J. F-1 Gas Generator (GG) Development Tests

This program was established to conduct tests on a F-1 engine gas generator (GG) with various injector configurations. The objectives are to alleviate detrimental pressure oscillations, reduce continued combustion in the turbine manifold, and increase combustion performance on the F-1 gas generator.

Evaluation of the P&VE designed concentric-tube injector was completed in September 1965, and a Block II gas generator ball valve and body and a Rocketdyne experimental doublet injector were installed in the test stand. Evaluation of this configuration began during the week of October 11, 1965. Testing continued for the remainder of this period with approximately 16 tests remaining to be completed in 1966.

K. Lox Pump Inducer

This program is being conducted in an effort to study the NPSH and suction characteristics of the Mark 3H lox turbopump hub-type inducer and the

Worthington hubless-type inducer. This information will be used to improve the F-1 turbopump.

Testing, using deionized water, on the hubless inducer was completed in March 1965. Testing, using liquid nitrogen, began in May 1965 and was completed in July 1965. Work then began on facility modifications in preparation for testing with lox, however, in August the program was cancelled by P&VE in order to implement a new program on further development of the hubless-type pump inducer. Testing, after facility modification is expected to get underway in January 1966.

L. S-IVB Auxiliary Propulsion System

This program is to establish an in-house capability for conducting tests on upper stage ullage and attitude control motors.

During January-February 1965, the steam injectors required for pressure attitude simulation testing of the 100 pound thrust Gemini prototype engine were completed. Testing of the steam ejectors began in February 1965.

Testing at simulated altitude (vacuum) began in early March 1965. The first Gemini qualification engine was successfully tested through a mission duty cycle on March 24, 1965.

Acceptance testing of Gemini qualification engine No. 4 was completed on August 17, 1965. This series of tests completed the Gemini Qualification Test Program.

M. S-II Insulation Program

This program is to study the effectiveness of the $LH_2$ tank insulation currently planned for use on the S-II Stage. Objectives of the test program are (1) To determine the heat transfer coefficient of the insulation and (2) To determine what effect, if any, fill and drain cycles have upon the

insulation and the adhesive. From January through July 1965, approximately 55 tests were conducted, using a 24" tank, with various type bonding material in an effort to determine the best insulation material for the S-II stage.

In August, testing began on a 70" tank under similar conditions as the 24" tank. Ten tests were successfully conducted. The tank was returned in October to P&VE for preparation for a series of tests to study field repair techniques and structural integrity of the insulation. One test was conducted in November 1965. The tank was then removed in preparation for testing of the 7' x 7' tank. Five tests were conducted in the remaining part of this period on the 7' x 7' tank. Testing will continue.

N. Ground Support Equipment

1. S-IVB Forward Prototype Service Arm Tip Assembly

The test of the prototype S-IVB forward service arm tip assembly was conducted for KSC to prove the design concept and correct deficiencies. Complete arms will be fully tested later in the new Saturn V GSE Test Facility.

The test program was completed on February 5, 1965. Approximately 125 disconnects and withdrawals were made. Redesigned umbilical housing support hardware was installed and tested during the first week of February 1965. This redesign consisted of adding an extension to the withdrawal cylinder and placing the support point for the umbilical housing closer to the center of gravity. This redesigned hardware performed acceptably and permitted much easier umbilical handling. Generally, the overall operation of the top assembly, as tested, was satisfactory.

An addendum to the original test program was conducted to test modifications which allow the umbilical carrier to be mated during simulated

vehicle movement. These modifications were made to the control system of the dual cylinder withdrawal mechanism. Performance was acceptable and the umbilical carrier can be mated to the simulated vehicle during random motion of ± 5 inches. Tests were completed and the prototype service arm was returned to Brown Engineering Company on May 5, 1965.

2. High Pressure Fluid Component Testing

The following tests were conducted for KSC, P&VE and Test Laboratory to qualify high pressure components for use in support of the Saturn V program:

a. Grayloc 10,000 p.s.i.g. Coupling Test This test for KSC was to qualify the Grayloc 10,000 p.s.i.g. coupling for use on pipe larger than 1 3/4" in diameter. Proof leak and bend tests were satisfactorily completed in December.

b. Autoclave Slimline Coupling Test This test was to qualify Autoclave series SF-250-CX (1/4"), SF-375-CX (3/8"), SF-562-CX (1/2"), and SF-750-CX (3/4") couplings for KSC. Testing was completed and a final Internal Note submitted on February 2, 1965. The SF-250-CX and SF-375-CX couplings are satisfactory for 10,000 p.s.i.g. service; however, the SF-750-CX couplings failed the bend test.

c. Calmec Cryogenic Pneumatic Solenoid Valve Testing was completed on the 3/4" Calmec cryogenic-pneumatic solenoid valve (P/N 400S-12F) and it was determined that the valve would not function at temperatures below -50° F. The valve also leaked, response time was excessive and the minimum operating pressure was in excess of the design maximum. Testing was completed November 5.

d. Vacco Regulator Tests These regulators were run in order to evaluate the Mississippi Test Facility regulators. Approximately 25 regulators (Models PCV-A, B, D, F, G & H) were tested. The test program was abbreviated

due to the lack of time. All regulators were satisfactory except the PCV-A&F. The PCV-A experienced difficulties due to relief seat failures just after flow was initiated. The PCV-F regulator proved to be a very poor regulator. Tests are continuing on these regulators.

e. Vacco Back Pressure Regulator (PN BPR-10P-X54610) This regulator was tested for KSC during the period of August-October and found to be unsatisfactory. A back pressure relief setting of 3500 p.s.i.g. was difficult to obtain and a pressure higher than this could not be obtained. Operation was also erratic.

3. Instrument Unit (IU) Pneumatic Console Test This test was conducted for P&VE to determine if the instrument unit pneumatic console will perform as designed. The purpose of this unit is to supply $GN_2$ to the air bearing $GN_2$ storage bottles as required during prelaunch operations and to verify the actuation pressures of the guidance systems OK pressure switches. Portions of the test are as follows:

a. Contamination analysis of the console and supply $GN_2$.

b. Leak test.

c. Gauge and transducer calibration test.

d. The spheres fill circuit flow tests (capacity flow and spheres fill time) and spheres fill curcuit cycle test.

e. The calips circuit timing test.

f. The calips circuit cycle test.

The results of these tests indicate the console will function as designed with the exception of supplying $GN_2$ for the air bearing spheres at the required cleanliness level. Testing began November 20, 1964, and was completed March 15, 1965.

4. S-IC Ground Support Hydraulic and Checkout Unit (LUT, MTF)

A qualification test program for P&VE was run on the S-IC hydraulic supply and checkout unit (P/N 53143-100) to determine if the unit was satisfactory, especially during engine ignition, for use with the S-IC stage on the LUT and Static Test Stands.

A 500 hour reliability test at 850° F operating temperature was completed. Leakage problems were encountered on the main RJ-1 pumps. Except for the leakage problems, the unit performed satisfactorily.

In conjunction with the hydraulic unit testing, the 1-2 tail service mast RJ-1 supply flex hoses were tested. The Fluid Dynamics and Titeflex hoses failed at pressures lower than the design proof pressures. An Aeroquip hose operated satisfactorily for 250 operating hours. Also, the S-IC, RJ-1 supply umbilical quick-disconnect was tested. One failure occurred at working (1,700 p.s.i.) pressure which was attributed to improper handling. Since the failure, the umbilical quick-disconnects have functioned satisfactorily for 400 operating hours. Also, a qualification test was performed on the S-IC Gimbal System Flight Filter Manifold Assembly during the hydraulic unit additional 500 hour reliability test.

The S-IC Ground Hydraulic Supply and Checkout Unit, as tested, was satisfactory for use in the S-IC ground hydraulic supply system.

The hydraulic unit will satisfactorily provide the maximum flow and pressure demand requirements of the S-IC stage and onboard hydraulic system during engine start with two or three pumps operating and requires no additional accumulators. It should be noted that the addition of two accumulators completely prevented the discharge pressure from dropping below 1,450 p.s.i.g.

Also, the hydraulic unit will provide the required flow and pressure when using either of the two Servo control pressure transducers (hydraulic unit transducer, PT1; or vehicle transducer, PT2; however, slightly better response is obtained with PT2.

The hydraulic unit, as tested, is satisfactory for use with operating RJ-1 fuel temperatures of 120° F at the main pumps.

The hydraulic unit fuel filtering system will satisfactorily clean the RJ-1 fuel to the required cleaning specification.

The test covered the period from January 25, 1965, through October 8, 1965.

5. Mobile Launcher (ML) Tail Service Mast (Prototype)

The test of the prototype tail service mast has been completed. The test was conducted for KSC to determine loads, eliminate system discrepancies, and to qualify all mast systems (lox, fuel and environmental) prior to final design of the production masts. The tail service masts are to be used on the ML to supply electrical, pneumatic, fuel, lox and environmental services to the Saturn V, S-IC stage. Tests were run from April 6, 1964, through May 1965. Items of possible interest are as follows:

a. During pneumatic and electrical de-energization of the mast retraction system with the mast in the extended position, the mast retracted several degrees. A hydraulic bypass line and check valve were installed on the prototype mast and will be reflected on the production masts. No further problems were encountered on subsequent runs.

b. On some test runs, the hood failed to close as the mast was retracted. Hydraulic orifices were reset, resulting in no further problems in hood closure.

c. Redesigned hood ball-locks interfered with the umbilical carrier assembly as the mast was retracted. The problem exists only when the centerline of the umbilical carrier does not remain parallel with the centerline of the arm structure during retraction.

d. Some difficulties (interferences, etc.) occurred between the KSC mast and the P&VE/Boeing umbilicals, which were not completely solved during the test program. Action was taken by KSC and P&VE to prevent a recurrence of the difficulties with the production equipment.

6. RJ-1 and Sodium Nitrite Servicer

A functional acceptance test program on the RJ-1 and sodium nitrite servicer (P/N 600-01052) was conducted for P&VE. The trailer mounted unit will fill and drain, from the ground, the LUT contained S-IC ground support hydraulic and checkout unit and the S-IC inert prefill unit.

Testing began January 11, 1965, and was completed in March. The $GN_2$ system, servicer fill, filtration, LUT fill, LUT drain, water separation and electrostatic charge tests were conducted. Failures requiring replacement of the LUT drain orifice valve and the $GN_2$ system pressure regulator have occurred; however, no serious problems have been encountered. One additional servicer was tested with an abbreviated acceptance test plan.

7. S-IC Inert Prefill Unit

An acceptance test program has been completed for P&VE on the S-IC Inert Prefill Unit (Dwg. 10M01695). This unit is mounted on the Mobile Launcher and provides an ethylene glycol and water supply for the F-1 engines. The unit was received for testing June 8, 1965. Testing began July 12, 1965, and was satisfactorily completed September 13, 1965.

8. Mobile Launcher Holddown Arm Test

The purpose of this test program for KSC is to verify the physical and functional integrity of the Saturn V holddown arms prior to installation on the Mobile Launcher. Four arms are used on each Mobile Launcher. One set was previously tested, found satisfactory and shipped to the Cape.

After the initial preload tests were run on the first arm of the second set, the simulated vehicle load tests on the holddown arm were initiated. The first load test consisted of preloading the arm to 800,000 pounds and then applying a download (rebound) of 3,000,000 pounds. The download was applied in 300,000 pound increments. The test was satisfactory with the strain gauge and deflection measurements showing no excessive values.

The next test was the application of the upload (thrust) on the arm. The arm was preloaded to a value of 800,000 pounds and thrust loads applied in 100,000 pound increments. It was intended to load the arm to 1,600,000 pounds, but the upper link failed at a load of 1,400,000 pounds, terminating the test.

The casting material of the upper line is ASTM-A-148-60, Grade 175-145, which has an ultimate tensile strength of 178,000 p.s.i. Strain gauges in the vicinity of the failure indicated stresses well below this value just prior to the time of failure.

On March 22, 1965, the second failure of the holddown arm upper link (Dwg. 75M-05817) occurred while undergoing a preload test. The upper link failed at a preload of approximately 425,000 pounds. At the time of failure, no upload (thrust) or download (rebound) was applied or had been applied to the holddown arm. The test criteria calls for the arm to be

preloaded through a range of 0-1,000,000 pounds. Examination of the test data indicated that all stresses in the arm were well below design values at the time of failure.

Upon examination of the two upper links which failed, it was found that small cracks existed in the casting that were apparently due to improper heat treating. A redesign was initiated by KSC and a new forged upper link was subsequently produced, tested and found satisfactory. This test program continued into CY-66.

9. Ground to Mobile Launcher Disconnect Mechanism Mating Test(Lox & $LH_2$)

This test for KSC was to insure the mechanical fit, structural integrity, thermal design, and satisfactory operation of the mechanisms prior to their installation and use on LC-39. The purpose of the disconnect mechanism is to connect and disconnect the LC-39 system cryogenic lines to the Mobile Launcher Umbilical Tower.

The hardware was received from KSC with incorrect dimensions which caused installation interference problems requiring major modification. This caused a considerable delay in getting the system ready to test. Testing of the $LH_2$ system was satisfactorily completed. The lox system modification has been completed and testing was completed October 11, 1965.

10. S-IC Holddown Arm for MTF

An acceptance test program was conducted for MTF on one S-IC Static Test Stand holddown arm. The arm and actuator system will be used to restrain and support the S-IC booster during captive firing tests at the Mississippi Test Facility. Testing was satisfactorily completed on September 8, 1965, ahead of schedule.

11. MTF Barge Lox Transfer and Topping Pumps

The Paul Chemical Company lox pumps (two 1,000 g.p.m., 250 hp. and one 250 g.p.m., 65 hp.) were tested during July and August to determine if they were acceptable for use at MTF for transferring liquid oxygen from the barges.

The tests revealed that the cold soak period (lox in pump) should be limited to 15 minutes unless provisions are made to prevent the grease (Halocarbon X90-15M-5A) from freezing.

12. S-IVB Forward Lanyard Prototype Service Arm Tip Assembly

The test of the prototype S-IVB forward lanyard prototype service arm tip assembly is being conducted for Kennedy Space Center to prove the design concept and correct deficiencies. The lanyard withdrawal concept is simpler and is being considered as a possible backup for the present dual cylinder withdrawal system, used on Saturn V.

Testing was completed in October on the prototype service arm. Approximately 50 disconnects and withdrawals were performed during the test program without any major malfunctions. Minor modifications were made to reduce the loads imposed on the vehicle.

13. Bingham Lox Pumps

This was a test program within Test Laboratory to check out the pumps originally scheduled to be used on the S-IC test stand. It consisted of twelve pumps with a flow from the largest pump of 2000 g.p.m.

Testing started September 7, 1965. The first tests were conducted with $LN_2$ on the 1000 g.p.m. pumps. Inspection after pumping $LN_2$ revealed no damage or wear. Pump, S/N 36536, failed while pumping lox after two hours and twenty minutes of accumulated time. The cause of the failure was due to a wear plate coming loose. The program is being discontinued due to lack of time required for an R&D program.

14. Service Arms

Qualification and acceptance tests are being conducted on the Saturn V service arm prior to installation on the Mobile Launchers at KSC for launch of the Saturn V space vehicles.

a. S-IC Intertank This preflight arm provides the S-IC stage with lox and contains an automatic reconnect capability in case of a mission hold or abort. The basic arm, control console No. 1 and the cryogenic lines were received on December 2, 1965. The umbilical, its carrier assembly, and the hinge assembly have an expected delivery date from P&VE and KSC of this month. The cryogenic lines are now being installed on the arm in the Assembly Building. The hinges have not yet been received.

b. S-IC Forward This preflight arm provides air conditioning, electrical, and pneumatic service to the S-IC stage. The service arm, control console, and related equipment were received on November 1, 1965.

The test umbilical was received on November 8, 1965. The pneumatic control console No. 1 was installed and leak checked on November 18, 1965, along with the pneumatic tubing on the arm. The hinges were received on December 6, and are now being mounted on the arm. Testing was completed December 17, 1965.

c. S-II Aft The S-II Aft arm structure was received on November 12, 1965, with its pneumatic and hydraulic control console. The pneumatic and hydraulic console have been installed along with the other various supporting hardware. The service arm has been instrumented. The hinge assemblies have not been received and, therefore, instrumentation, arm assembly, installation, and testing are dependent upon the receipt of these hinge assemblies.

15. Control (Lift-Off) Switch

Two control switch assemblies are mounted on the holddown arms to give the electrical signal for the umbilicals to release and the service arms to retract as the Saturn V vehicle lifts off. This test is now being conducted for KSC. The winch cam was found to hang up when being reset. The cam has been redesigned, is being built and will be retested. Testing was completed December 17, 1965.

## III RESEARCH AND DEVELOPMENT PROGRAMS

### A. Jet Impingement Program

This program was requested by Kennedy Space Center for the purpose of studying the feasibility of launching large flight vehicles from off-shore sites.

Eighteen tests were conducted through February 12, 1965, utilizing the 4K lox/RP-1 model engine. This concluded the single engine test program. A cluster engine test program is scheduled to follow at a later date.

### B. Jet Impingement on Lunar Surface

This program is to study the effects of a hot rocket jet impinging on simulated lunar soil samples.

Mechanical modifications, engine hardware installation, and instrumentation and control to the test facility were completed and testing began in April 1965. Twenty four tests were conducted on a limestone sample and nine tests on a flue ash sample at varying heights above the samples. These tests satisfactorily completed the requirements for this test program.

C. Scale Model Sound Suppression Studies

This program is concerned with scale model studies of sound suppression methods for statically fired rocket engines. Tests are conducted with a 1:20 linear scale model S-IC cluster (five 4,000 pound-thrust each model engines) firing into a 1:20 scale MSFC S-IC deflector.

From January to February 24, 1965, fifty two tests were conducted using only the center engine firing into the 1:20 scale deflector. These tests were conducted to supplement the original program to determine the optimum gas inlet/diffuser combination for the sound suppressor.

From February 24, 1965, until March 19, 1965, three baseline tests were conducted on the deflector using all five engines. The first test using the model sound suppressor was successfully conducted on March 19, 1965. Testing continued through June 1965, using different configurations and modifications in an effort to develop the most optimum sound suppressor.

D. Water Separator Program

This program is being conducted in an effort to design a water recovery device for the S-IC sound suppressor. Such a device will reduce the makeup water requirements.

Testing continued through May 1965, on the horizontal configuration and modifications thereto. A maximum water recovery of 91% was attained. The program objective was 85% recovery. The facility has been placed on standby status pending further test requirements.

E. Acoustic Studies

This program is being conducted to study the acoustical environment of scale model engines under static firing conditions.

Testing continued from the previous period until May 1965, to checkout and obtain data from a high frequency acoustical data acquisition system. This concluded the test program.

IV TRANSPORTATION

A. Water Transportation

The following shuttle barges were completed by Avondale Shipyards in New Orleans. The MTF shuttle barge "Pearl River" was delivered on May 3, 1965, and the "Little Lake" on July 31, 1965. The KSC shuttle barge was delivered on May 15, 1965.

The initial missile move on the MSTS ship USNS Point Barrow departed California on June 13, 1965, with the S-II Fit-up Fixture for MTF and a S-IVB for KSC.

The S-IC barge "Poseidon" delivered the S-IC-D stage from Michoud to MSFC prior to the completion of the shipyard modifications. The barge departed Michoud October 6, 1965, and arrived MSFC October 14, 1965.

B. Land Transportation

The first shipment of S-IC Stage Simulator to KSC was made in December of 1965, on S-IC Transporter No. 106. The simulator made the trip from Michoud to check out barges and tiedown equipment for trans Gulf Shipment and off-loading at the VAB dock. The transporter and simulator were also used for personnel training in operation of transporter in the VAB area and hoisting of the stage in the VAB.

The last four (of seven) S-IC transporters were completed in December 1965, by Dortech, Inc. of Stanford, Conn. under a contract from MSFC signed January 29, 1965. The hydraulic, pneumatic, electrical components

and wheel units were assembled in Stanford, Conn. The steel structures and final assembly of the four transporters were made at Murphy Division of Dorr-Oliver under subcontract to Dortech at Tampa, Florida. The completed transporters were shipped to Michoud from Tampa on the MTF shuttle barge "Little Lake".

C. Air Transportation

Super Guppy

In January 1965, Aero Spacelines informed MSFC that they were going to continue, on their own, with the S-IVB aircraft modification utilizing the major components of the Air Force YC-97J and commercial stratocruiser aircraft. Test Laboratory personnel then made contact with various Air Force organizations and The Boeing Company to determine the feasibility and operational characteristics of an aircraft with such modifications. It was pointed out that a number of unknowns existed and action was recommended to answer or eliminate as many of these unknowns as possible.

In March 1965, R-TEST-BT was assigned to actively monitor this program from the technical standpoint. It was determined that a wind tunnel test program should be conducted to determine if the Aero Spacelines configuration was feasible. The tests were conducted at United Aircraft's eighteen foot tunnel at East Hartford, Conn., in May 1965. The test results showed that the configuration chosen was feasible and would fly.

Contact was made with Air Force personnel at Wright-Patterson, Air Force Base and Warner Robins Air Force Base, concerning power plant installation. Further contact was required with Air Force personnel at San Antonio, Texas, concerning the Pratt-Whitney T-34 engine which was used on the original YC-97 J Aircraft and contact also made with Curtiss-Wright

at Caldwell, N.J., the propeller manufacturer, concerning the installation of their propeller on this configuration.

During the aircraft modification by Aero Spacelines, preparation was also being made by Douglas Aircraft Company to ship the S-IVB-201 from SACTO to Cape Kennedy via the Super Guppy aircraft. Douglas Aircraft Company designed the environmental and preservation equipment along with a pallet support system for air shipment of the S-IVB stage. This effort was considered necessary since the S-IVB was the first item and the most critical to be shipped in the Super Guppy aircraft.

Upon completion of the aircraft modification, F.A.A. required that an aircraft ground vibration survey be conducted on the aircraft. All of the work was conducted by Douglas Aircraft Company and was coordinated technically by this office. F.A.A. requested that the Curtiss-Wright B-120 propeller hub be modified to the B-312 propeller configuration which incorporation mechanical low pitch stops and are the same as the C-133 Air Force aircraft. A propeller vibration stress survey and F.A.A. flight check on aircraft stability and control are the only outstanding items remaining on the Super Guppy at the present. Prior to conducting these tests, a flight test with the S-IVB dynamic vehicle aboard will be conducted.

# V FACILITIES

## A. Saturn V (S-IC Stage) Static Test Stand

### 1. Brick and Mortar

The brick and mortar prime contractor completed all work, pending correction of some minor deficiencies in February, 1965. The deflector was accepted in March 1965. All contractor effort was completed in May 1965.

### 2. Technical Systems

The contractor (Aetron) completed installation and checkout of all technical systems in January 1965.

## B. F-1 Test Stand

All contractor work was terminated in January 1965. The contractor completed installation and checkout of technical systems in January 1965.

## C. Support Facilities - West Area

All items except grassing was completed in May 1965.

## D. Advanced Saturn Ground Support Equipment Test Facility

### 1. Brick and Mortar

All brick and mortar portions of the project were completed in May 1965.

### 2. Vehicle Motion Simulator

The Vehicle Random Motion Simulator equipment supplied by American Machine and Foundry Company was originally to be installed and checked out by August 27, 1965. The first position was not checked out until September 7, 1965. Final checkout and testing of the equipment

was completed in December 1965. The slippage which occurred did not affect the Saturn V program due to late delivery of swing arms.

3. Technical Systems

The contractor completed installation and checkout of the technical systems in March 1966.

E. Advanced Saturn Dynamic Test Stand

1. Brick and Mortar

The Contractor completed all work except final checkout of the 200 ton and 150 ton hoist and beneficial occupancy was obtained in January 1965. The hoists were accepted on May 24, 1965, and on June 3, 1965, a contract was awarded to Greenhut Construction Company for modifications and additions to the test stand required for the Saturn V Dynamic Test Program. On October 8, 1965 partial BOD for the modification effort was obtained which allowed The Martin Company to complete installation of the vehicle support pedestals. In November 1965, additional structural modifications and equipment hoists were contracted for, to be completed by April 15, 1966. On November 23, 1965, a BOD inspection was held in order to permit in-house effort to proceed for installation of SAT-IC-D on January 3, 1966.

2. Technical Systems

The Contractor, LSI, started installation of controls portion of the Technical Systems on June 18, 1965, and finished on September 16, 1965. The instrumentation portion started in September and was 20% complete in December 1965.

F. Expansion of Blockhouse, Lox Storage at Power Plant Test Stand, and Liquid Hydrogen Facility

1. Brick and Mortar

The construction portion was completed in mid February 1965.

2. Technical Systems

The major portion of the instrumentation and controls system for the Liquid Hydrogen Facility was completed in March 1965. The remainder of the technical systems was completed in June 1965.

G. Components Test Facility

1. Brick and Mortar

The contractor was scheduled to be completed by December 1964, but did not finish until June 1965.

2. Technical Systems

The contractor was originally scheduled to start installation in October 1964, but was delayed until December 1964, which adversely affected the activation schedule and increased the installation cost approximately $100,000.00. The completion of installation and checkout activities were completed August 25, 1965.

H. Addition to Components Test Facility

1. Brick and Mortar

The construction contractor was scheduled to be completed by July 21, 1965. The vacuum jacketed hydrogen piping was diverted to Mississippi Test Facility and this caused the construction contract to slip. The contractor was 98% complete in December 1965.

2. Technical Systems

Beneficial occupancy for installation of technical systems was obtained in July 1965. The installation of technical systems was 95% complete in December 1965.

I. Acoustic Model Test Facility

The contractor completed the construction portion in July 1965. The technical systems contractor completed installation in December 1965.

J. Modernization of Instrumentation and Control Systems in East Area

The Contractor was 80% complete with the overall project in December 1965.

K. Expansion and Modernization of High Pressure Gas Systems

Beneficial occupancy of the office area and steam plant was obtained in November 1965. Vacuum jacketed pipe diverted to MTF caused a slippage in construction schedule. In December 1965, the contractor was 83% complete.

L. Addition to Test Laboratory Support Shop

The contractor completed the construction in December 1965.

M. Extension to Components Test Facility Instrumentation

Beneficial occupancy of the building addition was obtained in November 1965, and the contractor was 95% complete in December 1965. The Technical Systems contractor started installation in November 1965.

N. Addition to Advanced Saturn GSE Test Facility

The construction contractor completed a sufficient portion of the project in November 1965, to allow the technical systems contractor to start installation of equipment in November 1965.

O. Saturn Support Test Area

1. Acoustic Control Communication Center was completed in November 1965.

2. The Replacement of Deflector Pit at the Power Plant Test Stand was completed in November 1965.

3. The Addition to Building S-4653 was completed in September 1965.

4. The Transportation Hangar was 75% complete in December 1965.

P. Additions to High Pressure Gas and Propellants System

Contract was started in August 1965, and was about 20% complete in December 1965.

Q. Engineering Building Extension

Construction began on October 26, 1965, and was about 5% complete in December 1965. Completion is scheduled for September 1966.

R. Nuclear Engine/Stage Test Stand - NRDS

The final A-E selection was on October 21, 1965. The firm selected was Kaiser Engineer, Oakland, California. The plan for directing the A-E work will be generally as follows: SNPO-N will administer the contract. The former arteries AD HOC Working Group with representation from the interested Centers monitoring the technical work. The Kaiser work: A five month study, including preliminary engineering and criteria preparation for E/STS2-3, was started November 20, 1965. Their work is being monitored by a task force consisting of approximately ten representatives from SNPO-W, SNPO-C, SNPO-N, MSFC, LASA, and AGC. (William Slivka, SNPO-W is project manager.)

S. The Lox Storage Tank Project for the F-1 Stand and additions to High Pressure Gas Systems were not approved in the FY-66 C of F budget.

Karl L. Heimburg

X

# TEST LABORATORY - HISTORICAL REPORT

January 1, 1965 - December 31, 1965

ADDENDUM

# Addendum to Test Laboratory Historical Report

January 1, 1965 - December 31, 1965

This portion of the Test Laboratory Historical Report was inadvertently omitted. Please attach to your copy of subject report under Part II, Saturn V Program.

## O. S-IVB Test Facility

In June and July, 1965, activation of the S-IVB Test Stand neared completion with the accomplishment of the following major milestones:

1. Liquid hydrogen was loaded into the S-IVB fuel tank on June 24,1965.
2. A successful engine thrust chamber and start bottle chill test was conducted on June 29, 1965.
3. On July 10, 1965, a satisfactory lox tank loading was conducted.

On July 13, 1965, an engine spin test was aborted because the power for the recirculation pumps failed.

On July 17, 1965, liquid nigrogen was loaded in the fuel tank to check out the fuel chilldown system, utilizing a facility power supply.

On July 19, 1965, a countdown test was conducted with $LH_2$ and lox in the Battleship. Due to a faulty electrical control assembly on the engine, no attempt was made to initiate ignition at X-0.

An eight second test, scheduled for July 30, 1965, was cancelled when the facility heat exchanger thrust chamber chilldown coil froze. A successful thrust chamber chill test was conducted on July 31, 1965. It was determined that the gaseous helium was excessively contaminated with gaseous nitrogen which froze in the heat exchanger.

The following table summarizes the tests conducted at the S-IVB test stand.

| Test No. | Duration (Seconds) | Date | Remarks |
|---|---|---|---|
| S-IVB-001 | 2.12 | 8/2/65 | Scheduled 8 second test erroneously cut by a redline observer. |
| S-IVB-002 | 9.00 | 8/10/65 | All test objectives were met and parameters appeared normal. |
| S-IVB-003 | 25.5 | 8/18/65 | The gas generator and fuel turbopump assembly were replaced post test, due to gas generator deterioration, and the resultant over-heating of the gas generator body. |
| S-IVB-004 | 10.17 | 9/8/65 | Planned duration was 80 seconds. However, the test was erroneously cutoff by a redline observer. |
| S-IVB-005 | 80.0 | 9/10/65 | The test duration was 80 seconds as planned. |
| S-IVB-006 | 400.04 | 9/15/65 | Countdown and engine performance were normal. |
| S-IVB-007 | 250.00 | 9/29/65 | All engine parameters appeared normal. Gimbaling was not accomplished due to engine restrainer release mechanism failed to operate. |
| S-IVB-008 | 418.24 | 11/16/65 | Gimbaling was accomplished. All engine and stage parameters appeared normal. |
| S-IVB-009 | 300.00 | 11/23/65 | Gimbaling was accomplished. All engine and stage parameters appeared normal. |
| S-IVB-010 | 388.90 | 12/8/65 | Gimbaling was accomplished. All engine and stage parameters appeared normal. |
| S-IVB-011 | 432.40 | 12/17/65 | Gimbaling was accomplished. All engine and stage parameters appeared normal. |

After test No. S-IVB-006, the S-II stage hydraulic was installed for gimbal testing. Engine J-2013 was removed from the test stand on October 4, 1965, and engine J-2027 installed.

During load testing of the 50-ton crane on October 6, 1965, the crane (with a rated load of 50-tons) collapsed, injuring two persons. Reason for failure was wrong size bolts were used in anchor plate.

During this period, a total of eleven tests were conducted for a total of 2,316.37 seconds.